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Dermatological Section.

June 17, 1915.

Dr. J. J. PRINGLE, President of the Section, in the Chair.

Case of Mycosis Fungoides; Tumours appearing during X-ray Treatment.

By E. G. GRAHAM LITTLE, M.D.

THE patient was a lady, aged 25. For three years she had suffered from a scaly eruption of the limbs and trunk, rather more plentifully distributed on the flexor surfaces, which had been diagnosed as psoriasis by several general practitioners. Various treatments had been applied, including chrysarobin, but without permanent success. Itching had not been a marked feature prior to the application of X-rays, which had apparently effected a remarkable change in the conditions. This treatment, devised for the "psoriasis," had been commenced in the middle of February of this year by a general practitioner in North London, who had given exposures over the whole surface of the body, in dosages which could not be ascertained, at intervals of a week or fortnight, the actual dates being February 16 and 23, March 9 and 23, April 6, 20, and 27, May 4, 11, and 19. During the course of this treatment—but not before it was undertaken—glandular enlargements in the axillæ, on the trunk three inches below the axillæ, in the neck and in the groin, were noted. It was deemed advisable to apply extra doses to these swellings, but as, notwithstanding, they increased in size and a tumour appeared in the pubic region, the patient consulted Dr. Godfrey, of Finchley, under whose care she had been at some time previous to the application of X-rays, and the exhibitor saw the patient in consultation with Dr. Godfrey on May 26, when the diagnosis of mycosis fungoides was proposed. At this date there was a tumour the size of a small walnut on the right side of the mons veneris, with unbroken surface, and another much smaller swelling the size of a Barcelona nut, on the anterior wall of the left axilla. On the neck, the upper arms, the chest and abdomen, there were some circinate scaly

patches, very reddened and infiltrated, and bearing signs of intense itching. The scalp was extremely scurfy all over. The face was puffy and red, and there was a general redness over the greater part of the body, which, as it had not been present before application of the X-rays, was ascribed to this cause. The entire surface was tender, so that combing the hair, for example, was a painful operation, and the patient found difficulty in obtaining comfort in any posture, while her sleep was disturbed. She was seen again on June 15, when all these symptoms were accentuated, and the tumour in the wall of the axilla had grown to the size of a tangerine orange but was still unbroken; a new tumour which had reached the size of a walnut had made its appearance on the back of the neck, and there were some small new tumours elsewhere. The patient was menstruating and did not wish to show the pubic tumour, which was reported to be steadily growing larger. There was general enlargement of glands.

It was, of course, open to doubt the diagnosis of psoriasis, and it was, in fact, probable that the earlier manifestations of disease which had been regarded as psoriatic had been really premycotic stages of mycosis fungoides. Howard Fox had, however, reported an instance of development of mycosis fungoides in an undoubted case of psoriasis, so that the metamorphosis was not unprecedented. But the interest of this case was enhanced by the very definite history vouched for by Dr. Godfrey, a practitioner of great experience, that there had been no glandular or other swellings until the application of the rays, and it seemed significant that the tumours had in fact appeared in areas where additional dosages of the rays had been given. Under these circumstances, which were sufficiently disconcerting, the exhibitor had not thought it wise to recommend the continuance of X-ray treatment, which might otherwise be one's first resource in such a case.

The general consensus of opinion expressed at the recent debate on mycosis fungoides seemed to be that X-rays were palliative rather than curative of the disease; Dr. Galloway had voiced a very general opinion in his summing up: "Considerable doubts evidently remain as to the possibility of cure by means of X-rays. There was no doubt that cases had recurred after the use of X-rays. Possibly the safest line in X-ray treatment was to confine it to the destruction of the actual tumours as they appeared."[1] In this case the greatest growth had been in parts treated with the rays, so that even the very limited use recommended by Dr. Galloway seemed undesirable.

[1] *Proceedings*, 1914, vii, pp. 215, 216.

DISCUSSION.

The PRESIDENT did not think that, on the whole, the original diagnosis of psoriasis held good. Among other points, the lesions were almost entirely flexural in distribution, while the tips of the elbows and the knees were markedly unaffected. He was personally of the opinion that the early eruption was a so-called "pre-mycosic" one. But he invited an expression of opinion as to the rôle played by X-rays in the production of the tumours, which he believed to be *nil;* and, arising out of that, the question occurred whether the continuation of treatment by X-rays would be justifiable. The number of the tumours and the extensive erythrodermia seemed to him to contra-indicate operation. He would expressly exonerate the practitioner from any blame for using X-rays in the case, and, indeed, he regarded such treatment as the only possible means of arresting or mitigating the severity of the disease.

Dr. SIBLEY said the wording of the title of the case gave the impression that Dr. Little considered the X-rays to have been the cause of the mycosis fungoides. He (the speaker) would suggest that the X-rays were a coincidence and that the patient had had a pre-mycosic dermatitis, for she said the rash had been very irritable for many months and was on the flexor surfaces: it had not been psoriasis. He did not consider she now had any evidence of X-ray dermatitis; the inflammation was fairly evenly distributed and nowhere localised. He advised pushing doses of X-rays on the tumour areas.

Dr. G. PERNET had no doubt as to the case being one of mycosis fungoides throughout. The fact that the tumours had developed after the application of X-rays he regarded as an accidental circumstance, not as a sequence of cause and effect. It was evidently a virulent case, as the tumours were forming rapidly. He recommended pushing the rays as practically the only method of treatment. He did not recommend salvarsan, as it was not successful in a somewhat similar case of his own. He thought it would be a help first of all to remove the tumours surgically.

Dr. DORE said it was difficult to explain the apparent failure of the X-rays unless one knew the details of the treatment. His view was that the tumours had appeared not because of, but in spite of the X-rays; and he thought it would be a pity to withhold the most efficacious form of treatment known for this disease.

Dr. SEQUEIRA agreed that the outbreak of tumours was fortuitous; he did not regard it as connected with the application of the X-ray treatment. He also recommended the pushing of X-ray treatment.

Dr. ADAMSON said that he would continue the X-ray application as that treatment was the only one which offered any hope of a cure. But he thought it would be well to ascertain first of all what doses of rays had already been given.

Dr. GRAHAM LITTLE, in reply, thanked members for their views, but the impression was so strong in the mind of the patient that the rays were the cause of the tumours, that any untoward progress would be attributed to the rays; hence he did not feel inclined to follow the advice tendered.

Case of Acute Striæ Atrophicæ.

By E. LAMING EVANS, F.R.C.S.

(Introduced by P. S. ABRAHAM, M.D.)

THE patient, aged 19, was a soldier who was wounded by a rifle grenade, in France, on March 12 last. He was admitted into the Orthopædic Hospital on April 12 with two discharging sinuses below and external to the left nipple. He was radiographed a few days later,

Acute striæ atrophicæ in a case of shrapnel wound of the thorax.

and on April 17 an operation was performed, a piece of metal being extracted from the lower sinus. The wounds made satisfactory progress. The patient was allowed up, but about five days later—i.e., May 25—he began to complain of severe headache, with a temperature of 100° F., and was therefore sent back to bed. There were no physical signs in the chest, abdomen, or central nervous system to account for his headache, but within a few days of his return to bed curious skin lesions made their appearance on the posterior aspect of the right lower chest and lumbar regions, and to the left of the mid-line in the lumbo-sacral region. The lesions consisted of areas of localized atrophy of skin running mostly horizontally, the floor of each area being pink with fine vessels like scar tissue; they strongly resembled striæ gravidarum. The patient complained of pain in the region of their distribution. The atrophic areas all appeared within two or three days, and after that no fresh lesions were observed. Headaches persisted for about a fortnight, and the temperature varied between normal and 101·2° F. during this time, the lesions meanwhile becoming much paler. The blood showed moderate leucocytosis; Widal's reaction and the Wassermann reaction were negative. The urine was normal. The patient had always had very good health, and gave no history of any serious illness.

DISCUSSION.

The PRESIDENT thought the lesions would be most correctly described as lineæ or striæ atrophicæ. In true acute atrophodermia (as the case had been named) there were extensive areas of atrophy of skin, preceded by patches of redness (not streaks), the nature of which it was usually impossible to determine. The severest case of the kind exhibited he had ever seen was in a middle-aged man who seemed otherwise in perfect health, but was neurasthenic and somewhat hysterical. He had not had typhoid fever, nor any ascertainable toxæmia. He had the condition to an extreme degree over his trunk, thighs, buttocks, and shoulders, but it was not connected with sudden disappearance of fat or any pre-existent stretching of the skin.

Dr. H. G. ADAMSON thought it a typical case of striæ atrophicæ, though the distribution was unusual.

Dr. F. PARKES WEBER said he considered this to be anatomically an absolutely typical case of striæ atrophicæ, or, as some preferred to call it, "lineæ atrophicæ." In most cases the condition was the result of distension of the skin by œdema or fat, but in the present case the ætiology was obscure, and the distribution was nearly unilateral, affecting the thoracic and lumbar regions of one side. He had seen two such cases in which the striæ atrophicæ

were quite or mainly unilateral, but in both there was intrathoracic disease present. Dr. H. D. Rolleston[1] published an illustration of a case in which the striæ atrophicæ (more numerous on one side than on the other) were associated with malignant disease of the pleuræ and peritoneum. In regard to Dr. Adamson's remarks, he did not think there was any connexion between striæ atrophicæ and macular atrophy of the skin; he regarded them as totally different states, so much so that, if the two were seen in the same patient, he would regard the association as a chance coincidence. He suggested that in the present case the almost unilateral distribution of the striæ might be accounted for. The patient had had a severe wound with fever and constitutional symptoms which, like typhoid fever and pneumonia and cachectic conditions in general, in some unknown way favoured the development of cutaneous striæ atrophicæ. The position of the patient in bed probably determined the localization of the striæ by rendering the skin more tense on one side than on the other.

Dr. GRAHAM LITTLE said this case was very much like one he showed at the Section[2] in a schoolboy from Haileybury, whose attack came on after mumps. He had striæ in much the same position, only lower down and on both sides; the condition came on acutely.

Dr. P. S. ABRAHAM said that Mr. Laming Evans kindly asked him to see this case a few days after the lesions appeared. "Lineæ" or "striæ atrophicæ" were, of course, usually the result of some abnormal distension or stretching of the skin during pregnancy or after a rapid fatty or other growth beneath the skin—they were, in fact, "symptomatic." Nothing of the kind, however, took place in this case; the atrophic lines were "idiopathic." Acute cases of the kind were extremely rare on the back, and very few had been so far recorded. The case most resembling the present one was described in the *British Journal of Dermatology* in 1891,[3] by Dr. Barrs, of Leeds, the condition following an attack of pneumonia, the striæ appearing in the lumbar region and being accompanied with considerable pain. Several others had been seen after typhoid fever—in the emaciated skin of the abdomen, and more often on the thighs. In this case it was difficult to connect the lesions which were situated in the right dorso-lumbar region with the shrapnel wound of the left side of the thorax; nor could they put them down to any recent acute constitutional disease. The patient was inoculated against enteric last October. A skiagram of the left side of his chest was taken a month before the condition appeared, but it was not likely that that had anything to do with it. He particularly asked the Sister of the ward whether the man was accustomed to lie on that part of the body or to scratch or press upon the skin there with his fingers, and the answer was in the negative.

[1] H. D. Rolleston, "Case of Remarkable Striæ Atrophicæ due to Cachexia," *Brit. Med. Journ.*, 1908, i, p. 494.

[2] *Brit. Journ. Derm.*, 1912, xxiv, p. 70.

[3] *Brit. Journ. Derm.*, 1891, iii, p. 152.

Dr. DAVID WALSH thought that if that kind of lesion was due to lying for a long time in one position it should be extremely common; he did not, however, remember having seen a case of the kind before. In this case he presumed it was connected with the wound, and probably great violence had been applied to the left ribs. There might be some question of the occurrence of *contre-coup* on the right side, and of the diffused force injuring the nerve terminals or arteries, or nerves or other tissues, and in that way producing a series of subcutaneous scars without definite anatomical distribution.

Case of Oriental Sore (after Treatment).

By P. S. ABRAHAM, M.D.

THE patient, a young man, went to the Persian Gulf last October, and in February he observed small sores on his leg and arm, which he attributed to mosquito bites. These increased in size, and he was advised by his friends to consult a native doctor, who applied some powder; but the lesions increased in size and became crusted ulcers. Five weeks ago the one on the leg measured 3½ in. by 2½ in., the other on the arm was slightly smaller; they both had a sinuous outline and were thickly covered with a dark crust. He scraped them thoroughly with a spoon, and immediately afterwards applied pure phenol with a brush, as he had adopted those measures with success in a similar case some years ago. Most people who saw this case had an idea that it was syphilitic; but oriental sore, of course, had nothing to do with syphilis. These sores were due to inoculation with Leishman-Donovan bodies, probably through some insect or intermediate host. After the operation, he sent the material to Dr. E. H. Ross for examination, but it was unfortunately lost. The scars left by the lesions were typical; they were slightly depressed, and as in this case often pigmented. There was an idea in the East that a single attack prevented a recurrence. The patient informed him that at Buzrah the people called them "date sores," as they were particularly common in the date season.

Dr. Abraham had to thank Dr. Sortain Hancock for the opportunity of seeing and treating the case.

Case of Pigmentation of Skin for Diagnosis (? Arrested Addison's Disease).

By J. A. Nixon, M.B.

The patient was a man, aged 33, in whom spontaneous universal pigmentation had developed during the last six years, until, at the present time, the whole body was of a dark brown tint, resembling the skin of a native of India. The man dated his condition from an attack of dyspepsia, with neurasthenic symptoms, six years ago. Immediately afterwards he noticed a gradual bronzing of the skin which was exposed to sunlight; and exposure to the sun always increased the intensity of the pigmentation. During the winter, or whenever he stayed indoors, there was a slight fading. There was also staining of the mucous membrane of the cheeks and tongue. At present there were no other signs of disease about him; no syncopal attacks nor asthenia, and no loss of weight. The exhibitor associated the condition with an attack of acute dyspepsia. Possibly at that time there was an inflammatory lesion which involved the region of the suprarenals and the solar plexus.

DISCUSSION.

Dr. Sequeira said that in 1910 he showed a man, aged 30, suffering from melanodermia, closely resembling the condition of Dr. Nixon's patient.[1] The interest of his case lay in the fact that the blood was typical of pernicious anæmia. The patient was extremely wasted, and lost all his hair and nails. Blood examination showed that only 1,135,000 erythrocytes, and poikilocytes, normoblasts and megaloblasts were present. The Section would be interested to know that under injections of arsacetin the condition of the blood gradually improved, and ultimately the red cells increased to the number of 6,000,000. The skin itched intensely and blebs formed. The patient had been seen recently and was now quite well. The pigmentation had disappeared and the hair was well grown. In reply to Dr. Parkes Weber, Dr. Sequeira said he had considered the case to be due to adrenal disease. He suggested that Dr. Nixon should make regular examinations of the blood-pressure in his patient and observe the effect of the administration of adrenalin.

Dr. F. Parkes Weber suggested that the illness six years ago was not ordinary dyspepsia, but was a severe affection of the suprarenal

[1] *Brit. Journ. Derm.*, 1910, xxii, p. 391.

capsules, giving rise to vomiting and asthenia, as met with in Addison's disease. Gradually compensation had been developed and the patient had more or less recovered from the most severe and dangerous symptoms of the suprarenal (Addison's) disease. The most striking symptom of Addison's disease was, however, the pigmentation of the skin and mucous membrane of the mouth. This had progressed to an extraordinary extent in the present case, in spite of the patient's recovery from the graver symptoms (vomiting and asthenia). It was noteworthy that in the most acute forms of Addison's disease pigmentation might be quite or almost absent, though it might gradually develop later on if the patient survived long enough.

Dr. ABRAHAM said that some years ago he was asked to see a somewhat similar case, an old man, an Englishman, who was even blacker than this patient; he looked more like a negro; the hands and all the upper part of the body were black. His first view was that the condition was argyriasis, but he could find no evidence of this nor of any other disease. With the exception of the discoloration, the man apparently was, and had been, in perfect health. He died a year or two afterwards of bronchitis. Permission for a post-mortem examination could not be obtained.

Dr. WALSH said the picture presented by this case did not at all correspond with Addison's disease in its typical form; reversion to an ancestral type of skin might be considered as an alternative explanation. The pigment in the deep cells of the epidermis possibly pointed to the time when our remote ancestors were black; he had not heard of any other explanation of the presence of pigment in the epidermis. It was admitted that some other skin conditions, such as ichthyosis, might be an expression of atavism.

The PRESIDENT, referring to Dr. Walsh's remarks, said that the patient had never had any coloured ancestors; even if he had, their mucous membranes would not have been coloured or pigmented as his were. He had thrown out the suggestion, which he was glad to hear so ably supported by Dr. Parkes Weber, that the case was one of arrested Addison's disease. He had an example of a similar occurrence under his observation at the present time in a man, aged 27, who had all the signs and symptoms of unquestionable Addison's disease three years ago, but these had apparently undergone spontaneous arrest about a year ago. The patient was a Hindu, but the tint of his skin had assumed that of a negro, whilst the pigmentation of his gums and oral mucous membranes was very dark. A course of treatment for recent syphilis by salvarsan and mercury had provoked no fresh symptoms of his original ailment.

Dr. SIBLEY said the man told him he had black gums long before the discoloration of the skin commenced. He evidently had, at one time, or still had, lichen planus, which had been called shingles, over his back, and there were several typical deeply pigmented lesions of lichen planus about on other regions. He was not prepared to say this had anything to do with the general pigmentation.

Case of Morphœic Sclerodermia.

By GEORGE PERNET, M.D.

THE patient was a girl, aged 14. The disease began a year ago on the outer side of the right thigh. When first seen at the West London Hospital in July, 1914, she presented two somewhat sclerosed patches in the above-mentioned situation. They were surrounded by an extensive "lilac" area, where the skin was coarse-grained. Over the corresponding area of the left thigh there was a certain amount of coarse graining of the skin. The disease had progressed on the right side and fresh areas of sclerosis had appeared above the original morphœic patches. Now, too, there were morphœo-sclerosed patches on the left thigh. The treatment had consisted in the administration of thyroid extract internally, and olive oil well rubbed in locally. Notwithstanding this the disease had extended, but over the original area there had been improvement so far as the actual thickening was concerned. The very wide margins of the "lilac" discoloration and the coarse graining of the skin were features of special interest.

Case of Extra-genital Primary Syphilis of the Wrist.

By GEORGE PERNET, M.D.

THE patient was a boy, aged 15, who first attended, on June 4, for an extensive characteristic secondary papulo-lenticular rash, with bad ulceration of the throat and typical adenitis. There was no evidence of anything in the shape of a primary lesion about the genitalia. But on the radial side of the extensor surface of the right wrist a raised lesion, the size of a sixpence, was noticed. This was indurated, more or less flatly convex, and had resulted from an injury due to a pointed piece of wire (molybdenum wire for electric lamps, the patient said). This had increased in size and festered, and had not responded to any ordinary form of treatment. The injury originally occurred three months previously, and the rash had been present about a fortnight or more when first seen. This lesion was evidently the primary sore, and, on investigation, the corresponding axillary glands were found to be indurated and much enlarged "*en paquet*." But the right epi-

trochlear gland was not affected, this being explained by the situation of the primary sore on the radial side of the wrist. Had the original sore been on the ulnar side, then the corresponding epitrochlear would have been involved. The left axillary glands were slightly enlarged only, and the left epitrochlear was not affected. He was ordered some mercury, and on June 6 he was given 0·15 gr. neo-kharsivan (B. and W.), a small dose, but after the intravenous injection his temperature went up to 104° F. All the symptoms, including the primary sore, had improved when shown on June 17. As to the source of the infection of the wrist injury, the only thing that could be elicited was that there had been a lodger in the house who had some bad skin trouble. The site of the original injury had not been sucked.

Dr. ALFRED EDDOWES said he knew the case of a young man who contracted syphilis, and whose father a few weeks afterwards developed a chancre on the wrist. When asked how he got it, he replied that he caught his wrist on a nail that was projecting from the arm of a chair. The husband conveyed the disease to his wife; so that within a few weeks three members of a family of four were suffering from acute syphilis.

Blue Tattooing of the Skin from Hypodermic Injections of Morphine.

By F. PARKES WEBER, M.D.

THE patient was a woman, aged 67, a morphinist, who from the age of 27 to the age of 59 had been accustomed to take morphine, almost entirely by the mouth, up to 8½ gr. *per diem*. She then entirely discontinued taking the drug until after an operation for gall-stones, about four years ago, when she got into the habit of giving herself hypodermic injections of morphine and atropine. Since then she had usually, in the course of every day (twenty-four hours), injected from 1⅔ gr. to 3⅓ gr. of morphine sulphate, together with from $\frac{1}{24}$ gr. to $\frac{1}{10}$ gr. of atropine sulphate under the skin of her upper extremities or the upper part of the front of her chest. At the present time the skin of these regions had a stippled appearance from innumerable minute bluish spots, each bluish spot marking the site of a former hypodermic injection.

These bluish spots constituted a kind of tattooing; probably some iron substance derived from the needle of the hypodermic syringe had

on each occasion remained under the skin. Similar bluish spots in the skin of a morphinist (a man) under the care of Dr. Francis Hare were due, as Dr. Hare kindly informed Dr. Weber, to minute carbon particles introduced under the skin with the hypodermic syringe, as the patient had been in the habit of disinfecting the needle of the syringe in the flame of a wax match or of a wooden match. In fact, in that case the bluish spots were due to a genuine blue-black tattooing, since for that purpose the finest quality of Indian ink or Chinese ink (which consisted of very minute particles of soot or carbon) was, Dr. Weber believed, usually employed. Dr. Hare's patient had been distressed in regard to the presence of the bluish spots, for he regarded them as very "tell-tale," and likely to prevent him from obtaining a desired appointment. In Dr. Weber's case, though the bluish spots exactly resembled those produced by tattooing with carbon particles or Indian ink, it seemed far more probable that they were produced by minute iron particles from the hypodermic needle, since the patient had always cleaned the needles, she said, by washing them out with hot water, and had never disinfected them in any flame. Similarly, workers in some trades developed blue marks in the skin from the entry of particles of iron.

In addition to the bluish spots the patient had a few little hard fibrous nodules in the subcutaneous tissue, resulting also doubtless from hypodermic injections.

Dr. Weber thought it must be exceedingly rare to see in Europeans typical keloids produced by hypodermic injections of morphine at the site of each injection, but he understood that they not rarely resulted amongst Chinese morphinists, and Dr. R. Bruce-Low had kindly given him a photograph of a Chinaman, a morphinist, whose upper extremities were covered with keloids, the result of hypodermic injections of morphine. The great tendency of the yellow and black races to develop keloids was remarkable.[1]

[1] Cf. A. G. Brenizer, "Keloid Formation in the Negro," *Ann. of Surg.*, 1915, lxi, pp. 83-87.

Congenital Sclerodermia and Sclerodactylia.

By E. A. COCKAYNE, M.D.

F. M., MALE, aged 1 year 3 months. First child of healthy parents. There was no history of a similar condition in the family. The mother was not ill during pregnancy. There had been no miscarriages. Patient was a premature child born at the eighth month; very small at birth. Even at birth the areas of affected skin were as extensive as at the present time, and the fingers could not be straightened. According to the mother's statement the limbs were not swollen. The hair on the scalp was abundant at first but began to fall out at the age of 4 months.

When first seen at the age of 7 months the child was undersized; weight, 9 lb. 4 oz. There was hydrocephalus, the head measuring 16¼ in. in circumference. The condition of the skin was almost identical with that seen at present. The Wassermann reaction was negative. The child had grown slowly and now weighed 10 lb. 12 oz. The head measurement was 18¼ in. In February a symmetrical increase in thickening on the outer aspect of both thighs took place. The thickening gradually decreased and no other change had been noticed. The scalp was shiny and almost hairless, and the eyebrows and eyelashes had almost disappeared. The skin of the face was thickened and shiny, but the most marked atrophy had occurred over the ears and alæ nasi. The skin of the abdomen and chest was much affected, that of the back and buttocks was normal. The skin of the groins, scrotum and penis was also unaltered. The skin of the upper arm had escaped, but from the elbow downwards there was marked sclerodermia. The hands showed typical sclerodactylia, the fingers being fixed in a position of flexion. Movement at the wrist-joints was restricted. In the legs there was much thickening of the skin over the outer aspect of each thigh; that on the inner aspect was less affected. In the lower part of the leg the whole of the skin was uniformly thickened. The toes were fixed in the "hammer-toe" position. The toe- and finger-nails were atrophic. The finger-nails were growing slowly, but for a long time no growth had been observed in the case of the toe-nails. There was limitation of movement at the ankle- and knee-joints, the latter being incapable of complete extension. There was sweating in the palms of the hands especially.

The child was treated with mercury for six months without effect and for the last month had been taking thyroid extract.

DISCUSSION.

Dr. F. PARKES WEBER said the case showed the typical distribution of generalized sclerodermia (with sclerodactylia) of adults; not that of sclercedema or sclerema neonatorum.[1] The most serious disease in this child was the hydrocephalus. In regard to the generalized sclerodermia, improvement might doubtless occur, as it sometimes did during the hypertrophic stage of the acroteric type of sclerodermia ("acro-sclerodermia") in adults. When, however, the atrophic stage was reached (with contractures of fingers or toes) no improvement was at all likely to take place.

Dr. ADAMSON regarded it as true sclerodermia, and it was in his experience unique at so early an age. He agreed with Dr. Weber that the atrophic part would not recover, but the other might.

Dr. PERNET suggested that lumbar puncture might be of some use in the circumstances, considering the hydrocephalus.

The PRESIDENT thought that the undoubtedly congenital existence of the disease might be considered incompatible with the diagnosis of true sclerodermia; and that was his own view, despite the close resemblance of the child's condition to that disease. He pointed out that a certain number of cases of sclerema neonatorum recovered, as this baby was apparently doing.

Case of Hydroa Æstivalis.

By G. F. STEBBING, M.B.

THE patient, a girl, aged 14, developed, five years ago, a rash on the hands and face, and it had persisted ever since, with remarkable seasonal variations. Every winter the rash practically disappeared, and every spring it came back again. It was rendered worse by exposure to the sun; vesication and pustulation occurred, and in some places there had been large weeping sores, which took several days to clear up. One or two spots had appeared on the fronts of the legs after she had been "paddling," while staying at a convalescent home. The skin generally was not hypersensitive, and he could not produce factitious urticaria. The red blood cells were about 6 millions, and of the white cells 50 per cent. were small mononuclears.

[1] In sclerema and sclercedema neonatorum the patient generally either died or recovered completely. Only in one or two cases of recovery had any patches of atrophic skin been left behind as a permanent result of the disease.

DISCUSSION.

Dr. F. PARKES WEBER said that when he saw the patient at the Lambeth Infirmary he had regarded the case as one of a "dermatitis æstivalis." The case was a very extreme one to be classed as one of "summer prurigo," and yet there were not the vesicles or blebs of "hydroa æstivalis" present. The question of diagnosis was interesting, as the present case had been at one time supposed to be one of scabies, and at another time pellagra had even been suggested as an alternative possibility. The appearance between the patient's fingers might certainly make one think of scabies, and such a mistaken diagnosis might be further favoured by the patient's complaint of itching when warm in bed at night-time.

Dr. ADAMSON said this was a characteristic case of the common disease known as summer eruption, or Hutchinson's summer prurigo. He had endeavoured to show in an article published some years ago in the *British Journal of Dermatology* that there was no sharp line between this affection and hydroa æstivalis.

The PRESIDENT said he considered the case a fairly typical one of the milder type of hydroa æstivalis. His impression was that the disease was commoner in boys than in girls; but his experience was based on the observation of golf caddies, who are much more exposed than most girls to its exciting cause.

Dr. PERNET said the ozœnic odour from the patient's nose suggested a general toxic condition, which might have made the rash more virulent than otherwise would be the case.

Dr. STEBBING replied that the patient came under treatment on account of the condition of her nasopharynx; she was suffering from chronic ethmoiditis.

Case for Diagnosis; so-called Acne Agminata of Crocker.

By DAVID WALSH, M.D.

THE patient, a man, aged 25, had a papular rash in the right supra-orbital region, which presented a sheet of confluent pale red papules, with a few satellites, and had existed for two years. It was painless, though there were sometimes a few subjective symptoms. The condition had progressed steadily, in spite of all treatment. Two Wassermann reactions were negative, and both autogenous and stock vaccines, also X-rays, had been used. He improved a little, and latterly there had

been some small atrophic scars. A biopsy showed hyperplasia of the sebaceous glands, with other changes that could be seen in the microscopic sections submitted. He invited opinions as to diagnosis and treatment. Anti-syphilitic remedies yielded more improvement than anything else, though he had used many kinds of local and general treatment.

DISCUSSION.

Dr. MACLEOD said that he had examined the sections from the case and had noted in them a definite increase of gland tissue and, in addition, small clusters of cells irregularly distributed in the corium. With the high power these clusters were found to be largely made up of plasma cells. with here and there cells with two or three nuclei but no definite giant cells. The microscopical appearances reminded him of those from a case which he had seen at Charing Cross Hospital under Dr. Galloway, except that in that case there were a number of giant cell systems. The clinical appearances of clustered papules, which disappeared leaving scars, also recalled that case. The speaker considered that the affection belonged to the tuberculide group and was closely related to the cases which had been described by Dr. Crocker under the heading of "acne agminata."

Dr. GRAY said that the sections looked much like those of acne agminata, a case of which he showed not long ago. The behaviour of the two cases was also similar. In his own case there was some overgrowth of sebaceous gland tissue, and there were giant cells, but he had not seen the latter in the sections now exhibited.

The PRESIDENT said that Dr. Walsh had courteously sent him before the meeting the sections now exhibited. He verified the existence of hypertrophy of the sebaceous glands but had been puzzled by the associated collections of cells of inflammatory type. He now remembered distinctly the case brought forward some years ago by Dr. Galloway and Dr. MacLeod, and the clinical features of atrophy and pitting present in it. He did not doubt that the case under discussion belonged to the same category as that referred to by Dr. MacLeod. He thought it likely that many cases formerly described as "agminate adenoma sebaceum" were not of that nature, but identical with Dr. Walsh's most interesting case.

Case of Lichen Planus Atrophicus, Sclerosus et Morphœicus.

By J. H. STOWERS, M.D.

THE patient, a married woman, aged 34, was stated to have enjoyed good health until the time of her marriage, nine years ago; but a few weeks later she suffered a nervous breakdown, with much depression, attributed to the sudden death of her father from heart disease. Her health gradually improved until about six months before the birth of her only child (which took place in May, 1908), when about a dozen "spots" were stated to have developed upon the back of the neck. These were said to have been red in colour, flat, smooth, and irritable.

During the year 1913 the patient was again subjected to much domestic anxiety and worry, and in January, 1914, fresh lesions developed symmetrically on the inner aspect of each thigh about 4 in. long by 1½ in. broad, the long diameter corresponding with the axis of the limbs, followed by others upon the hips, the anterior surfaces of the legs below the patellæ, and a few scattered patches on the abdomen immediately below the navel. The mucous membrane of the mouth was not involved.

The patient now presented numerous well-marked discrete and confluent patches of nacreous white skin characteristic of the atrophic form of lichen planus in the positions indicated, the sensation of the patches being much impaired. Special attention was drawn to the conspicuous and almost exact symmetry of the cutaneous lesions corresponding in a marked degree, both in extent and position, with those in another female patient, aged 45, previously exhibited, coloured drawings of which were shown.

Case of Adenoma Sebaceum.

By J. H. STOWERS, M.D.

THE patient was an unmarried female, aged 20, the third of four children and living with her parents. She was engaged in laundry work. Her general health had always been good, the only illness in her recollection being measles when a young child. Her mental condition was normal, and there was no history of nervous disorder in any

member of the family. The disease commenced to develop when the patient was aged about 8 years. The lesions, which were very characteristic both in colour and size, involved the whole of the face, except the upper forehead, and some parts of the sides of the neck, the vascular tumours being especially numerous and clustered round and above the alæ of the nose. The small, red, rounded tumours existed in close contiguity over the entire surface of each cheek with marked vascular ramifications and telangiectases.

A remarkable feature of the case was the presence of multiple small fibromata and sebaceous developments of various kinds upon the back and shoulders, which were stated to have appeared several years after the facial eruption had existed and which suggested a causal relationship.

DISCUSSION.

Dr. F. PARKES WEBER, discussing the last case, asked whether any members had, in other cases, ever noticed the association of the telangiectatic form of adenoma sebaceum on the face with the presence of small molluscous fibromata on the loins. That association constituted a feature of the present case.

The PRESIDENT said he was not familiar with associated lesions which he could identify as definite molluscous fibromata; various kinds of nævoid growths all over the trunk and limbs were generally met with in connexion with adenoma sebaceum.

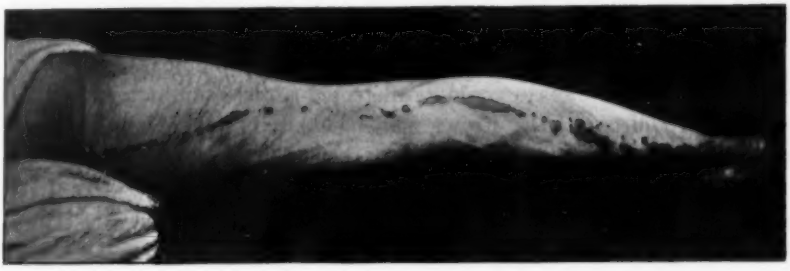
Case of Lichen Planus Linearis.

By E. G. GRAHAM LITTLE, M.D.

THE patient was a gentleman in business in Wales, aged 51, sent to the exhibitor by Dr. Davies, of Tredegar, with the history of an acute development of the eruption at the latter part of February, patches of typical lichen planus appearing on the inside of the knees, the fronts of the wrists, the front of the legs, and on the prepuce and scrotum. At the same time appeared the linear streak of disease now present, stretching from the middle of the right buttock down the middle inner third of the posterior aspect of the right thigh, undergoing a short interruption of the line just above the popliteal space, then resumed in a thicker line just below this space, coursing over the bulge of the calf, from which it bent towards the inner third of the lower leg, ending on

the outer side of the ankle, and in an indeterminate line at the base of the little toe. The mucous membranes were free from disease. The patient had suffered very great bereavements and misfortunes, having within the last two years lost three brothers, a sister, his father, wife, and only child, and having, as a consequence of these events, become burdened with the support of four families.

The case constituted the most perfect example of linear lichen planus that had come under the notice of the exhibitor. No cause could be ascertained for the peculiar distribution. There had been no



Case of lichen planus linearis.

injury or pain in the site of chief incidence; the linear eruption was about ½ in. in width, raised ¼ in. from the surrounding level, and of a deep bluish-red tint; itching was severe.

Case for Diagnosis. ? Pellagra. ? Addison's Disease.

By E. G. Graham Little, M.D.

The patient, a boy, aged 12, had come to the Out-patient Department of the East London Hospital for Children the day before. He was born in Poplar, and had lived in the same street in that district since his birth. He had had measles and whooping-cough in earlier childhood, and, four years ago, had had the operation of circumcision at the same hospital for some difficulties of micturition. He had made a complete recovery, and up to last Christmas was in robust health, as a photograph taken some time before that date showed. About this time he began to have headache and vomiting, which persisted for some three weeks continuously, vomiting taking

place after each meal. The motions were irregular, usually in the sense of being too frequent. The father was a dock labourer in fairly comfortable circumstances. There were three older children and five younger, and all the others are healthy. Photographs of the three older children were submitted and showed well-built young men—one in the army, another a sailor—and a sister, aged 18, plump, and in every respect normal.

Present condition: Since his illness had begun the boy had eaten his food badly, and was now excessively emaciated. His height was 4 ft. 6 in., and his weight only 3 st. 1 lb. 12 oz. He was hardly able to get about and was very quickly tired. The skin was stretched over the bones of the face as on a dried skull, and there was involuntary twitching of the angles of the mouth—the risus sardonicus. No abdominal or visceral disease could be detected after examination by the exhibitor's colleague, Dr. Frew, who had kindly taken the boy into hospital for further investigation.

The condition of the skin: Over the greater part of the body there was a general desquamation and follicular keratosis, with short projecting spines, rather like an abortive lichen spinulosus, but with no inflammatory redness of the follicles. On the dorsum of the hands, on the neck, especially the nape, on the lower abdomen and genital area and upper part of the thighs there was deep walnut-hued pigmentation of the skin, which was smooth over the hands and neck, but especially spiny over the abdomen and thighs. There was no pigmentation of the mucous membranes.

DISCUSSION.

Dr. F. PARKES WEBER thought that Addison's disease was a more likely diagnosis in this case than was native English pellagra. For the acceptance of the former diagnosis it was unnecessary to find evidence of tubercle elsewhere in the body. Not all cases of Addison's disease were due to tuberculosis of the suprarenal glands. Some, for instance, might be due to an acute toxic atrophy of a large part of those organs. Though Addison's disease was very rare in children, when it did occur, it seemed generally to commence between the ages of 10 and 13. He had, unfortunately, not seen the follicular affection of the skin of the patient's trunk, but that was possibly a condition quite independent of the cutaneous pigmentation.

Dr. GRAHAM LITTLE, in reply, said his suggestion as to tuberculosis was to explain the diarrhœa. With regard to the diagnosis of Addison's disease, Dr. Frew, whose opinion was a very sound one, said he had never known a true case of that disease occurring so early in life.

Lichen Spinulosus and Folliculitis Decalvans.

By S. E. Dore, M.D.

The patient, a woman, aged 43, was kindly sent to the exhibitor's department at Westminster Hospital by Dr. Kinnier Wilson. The case bore a rather close resemblance to one shown by Dr. Graham Little at the April meeting of the Section. In Dr. Little's case, which he called "folliculitis decalvans et atrophicans," there was loss of hair from the axillæ and pubes, as well as the scalp. The present patient had had characteristic folliculitis decalvans of the scalp for two years. There were several small circular and irregularly shaped atrophic patches in the occipital and frontal regions, and several large ones in other parts of the scalp. The patches were smooth, shiny, and slightly depressed, encroaching on the healthy hair by means of convex processes, and there was no sign of perifollicular inflammation. For nine weeks she had had a follicular eruption indistinguishable from lichen spinulosus on the abdomen, back, chest, thighs, neck and ears. The eruption consisted chiefly of minute, scattered, skin-coloured, acuminate, or spiny non-inflammatory papules, but a few were larger and reddened, or excoriated. The patient had suffered from thread-worms since childhood, and attributed the thread-like lesions to the worms "coming out."

DISCUSSION.

Dr. Graham Little said he thought the difference between his case and the present one lay in the fact that the axillæ in the present patient were normal. The most curious feature in his own case was that the hair in both axillæ and pubes was destroyed. His patient also had lichen spinulosus, but it was a more definitely spiny condition than was the present case. In this patient, taking into consideration the physique, he thought the spiny eruption was a coincident lichen scrofulosorum. He hoped Dr. Dore would have the tuberculin test made.

Dr. Adamson said that the scalp condition was folliculitis decalvans, and that all one could say about the eruption on the trunk was, that it was folliculitis. It was interesting to compare this case with that shown by Dr. Graham Little at the last meeting, and he thought it possible that in folliculitis decalvans folliculitis would be more often found on the body if looked for.

Dr. MacLeod agreed with the diagnosis of folliculitis decalvans.

Case of Lichen Planus (Circinate and Atrophic).

By Alfred Eddowes, M.D.

The patient, a female, aged 30, had been suffering from the disease for a year. Two or three months ago the rings were not very distinct, but lately the diagnosis had become easy because fresh lesions had appeared which were obviously lichen planus. She complained of intense irritation. The exhibitor would be glad of any suggestion for treatment likely to accelerate recovery. The lesion that first appeared much resembled the papular squamous circinate syphilide. Wassermann's reaction was negative, and there was no evidence of syphilis. The irritation might have been aggravated by the fact of the lesions on the feet being liable to friction, and to their situation among varicose veins.

The President suggested the use of X-rays to allay the irritation.

Case of Pityriasis Rubra Pilaris.

By J. H. Sequeira, M.D.

The patient, a married woman, aged 21, had been under Dr. Sequeira's care in 1910 suffering from pityriasis rubra pilaris. She got quite well and remained so until the end of April, 1915. She was admitted to the London Hospital on June 12, 1915, with a widely spread eruption, mainly of the diffuse type (erythrodermia). The scalp was scaly, and the face, neck, shoulders, abdomen and upper extremities were of a brick-red colour, the surface covered with fine adherent scales. On the upper part of the back the eruption had similar characters. On the breasts and on the lower part of the back and thighs the lesions were discrete, closely set pink papules, with caps of fine adherent scales. The legs below the knees and the feet were free. The nails were unaffected. There was no evidence of visceral disease.

Dermatological Section.

July 15, 1915.

Dr. J. J. PRINGLE, President of the Section, in the Chair.

A Persistent Gyrate Eruption (Erythema Gyratum Perstans).

By J. J. PRINGLE, M.B.

THE PRESIDENT brought forward a man of Scottish birth, aged 40, occupied as a shampooer in a Turkish bath, who presented a persistent circinate and gyrate eruption, as to the nature of which he entertained some doubt. The condition was said to have first appeared in the beginning of June as a patch, "the size and the shape of a pear," over the right scapular region; a few days later other similar patches developed, affecting in consecutive order the back, the front of the chest, the abdomen and inner aspects of the thighs, all of these regions being involved when the patient came under observation on June 22. Since that date the eruption had also appeared on the calves of the legs. The lesions, which were pretty accurately symmetrical, consisted of large circles, and gyrate figures produced by their intersection. Their margins were vivid pink in colour, and were faintly infiltrated and slightly raised above the general skin level, their elevation being more perceptible to touch than to inspection. Some of the elementary circles measured 2½ to 3 in. in diameter. The slightly elevated margins were continuous—not papulated—and were not scaly or "wrinkled"; nor did the skin in the centre of the patches show any abnormality of the epidermis, or any greasiness or pigmentary change. The eruption appeared to begin as a circinate one, no centrifugal extension from any primary eruptive element having been noticed, either by the exhibitor or by the patient; and when the circular lesions were once present they had not been observed to extend at the periphery. They varied, however, considerably in colour from day to day, and became distinctly paler

after the patient remained stripped for some time. There was no itching. There was no history of syphilis and the Wassermann reaction was negative. Ordinary and differential blood counts revealed no abnormality. The urine and internal organs were normal. The patient expressed himself as being in "perfect" health. No fungus or undue number of bottle bacilli were present in scrapings. Mr. Beddoes had pointed out that the patient had severe pyorrhœa alveolaris. The observation was important and suggestive of a definite toxic cause for the eruption. But pyorrhœa alveolaris was an almost universal disease amongst hospital out-patients, and the eruption under discussion was a very rare one.

Treatment by weak sulphur-resorcin-salicylic paste had exerted no influence on eruption, but had set up a slight degree of diffuse dermatitis, and had not prevented the development of the condition in other parts (e.g., the calves). No internal treatment had been adopted.

The exhibitor had considered the possibilities of the eruption being a circinate pityriasis rosea, a ringed seborrhœic dermatitis, an annular lichen planus or psoriasis, or a tinea circinata, but he had rejected all of these diagnoses for reasons which might be gathered from his description of its objective characters. His diagnosis—admittedly one "of embarrassment"—was that of an *erythema gyratum perstans*, although it differed in many material respects from the cases described by Dr. Colcott Fox under that name in 1901[1] (previously demonstrated to the Seventh International Medical Congress in 1881, although not recorded in its *Transactions*), and by Dr. Grover W. Wende,[2] of Buffalo, U.S.A., in 1906.

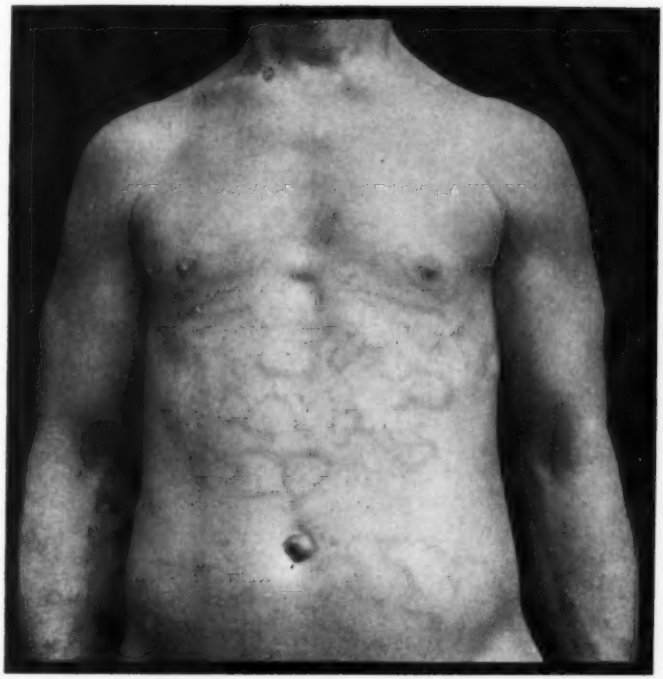
DISCUSSION.

Dr. ADAMSON thought the diagnosis rested between Dr. Colcott Fox's persistent circinate erythema and pityriasis rosea circinata. He could not make up his mind to which of those it belonged.

Dr. GRAHAM LITTLE did not think the case could be included in the category of Dr. Colcott Fox's gyrate erythema, inasmuch as Dr. Fox had suggested that diagnosis for a case which Dr. Little had shown at this Section in which there was very distinct vesication, and this feature was entirely absent here. Dr. Little was quite convinced that it was a case of pityriasis rosea of the type named by Darier "pityriasis rosea gigantea," of which

[1] *Internat. Atlas of Rare Skin Dis.*, 1901.

[2] *Journ. Cutan. Dis.*, 1906, xxiv, p. 241, with bibliography.



Dr. Pringle's case of persistent gyrate eruption (erythema gyratum perstans).

a photograph had been kindly lent to him by Professor Nékám, for use with his paper on pityriasis rosea,[1] with which it was reproduced. He had never seen an instance of this type, which was certainly extremely rare, until a few weeks ago, when a very characteristic case had appeared at St. Mary's Hospital, which bore a strong resemblance to the present case. The patient was a woman who gave a most convincing history of the pioneer patch, and she developed circinate patches the size of the palm, on the hand, which were devoid of fungus, and cleared up in the usual way.

Mr. McDONAGH thought the case was an example of the gyrate form of pityriasis rosea.

Dr. MACLEOD did not think it was pityriasis rosea; he believed it to be a toxic erythema. The scaly condition of the lesions on the arm seemed to be due to treatment with resorcin.

Dr. STOWERS, while admitting the exceptional character of the case, said that its prevailing features so far resembled pityriasis rosea that, uninfluenced, he would have regarded it as an unusual example of that disease.

Dr. PRINGLE said, in reply, that his case was not in complete accord with those described under the same name by Dr. Colcott Fox, which, as Dr. Graham Little had said, vesicated. He could not accept the diagnosis of circinate pityriasis rosea advanced by Mr. McDonagh and Dr. Stowers, as the primary lesions—which he had studied with special care—presented none of the essential characteristics so typical of that disease. The localization of the first lesions and their gradual extension from above downwards had suggested that diagnosis *in limine*, but he had abandoned it. Unfortunately, he did not know the disease described by Darier as "pityriasis rosea gigantea." He placed considerable importance on the fact, which he had observed for himself, that rings varied greatly in intensity of colour with changes of temperature; and this seemed as incompatible with a pityriasis rosea as it was suggestive of a member of the erythema exudativum group.

(*Post scriptum, July 31, 1915.*—Since the meeting Dr. Adamson has drawn my attention to two cases of circinate erythematous eruption shown by him to the Dermatological Society of London in 1906[2] and 1907.[3] Both presented considerable resemblances to the case under discussion. Dr. Graham Little has also drawn my attention to his remarks on pityriasis rosea gigantea in his address to the Section in February, 1914.[4] He has most kindly sent me Professor Nékám's

[1] *Proceedings*, 1914, vii, p. 133.

[2] *Brit. Journ. Derm.*, 1906, xviii, p. 403.

[3] *Ibid.*, xix, 1907, p. 199.

[4] *Proc. Roy. Soc. Med.*, 1914, vii, p. 133.

original photograph of a case of that very rare disease under his care; but a glance at it, especially at the characteristics of the central portions of the lesions, will show that it differs widely from the case I exhibited, which, moreover, cleared up suddenly and completely ten days after its exhibition in a manner quite unlike any form of pityriasis rosea.—J. J. P.)

Pigmentation around the Mouth in a Boy, aged 14.

By E. G. Graham Little, M.D.

Dr. Little said he brought the patient in the hope of receiving help in regard to both diagnosis and treatment. More than a year ago the lad, while at a public school, had an inflammatory affection about the mouth, which was thought to be tinea, and for some weeks he was painted with tincture of iodine. A good deal of chronic inflammation appeared to have preceded the pigmentation. He was a native of Trinidad, but he had been in England for some time for purposes of education. The mother was half French and half English, and was, like the son, a brunette. There was no accentuation of pigmentation in other parts of the body or of the mucosa. The iodine was stopped at least eight months ago, and no other irritant had been applied. During the last four or five months he had been having peroxide of hydrogen lotion and had got somewhat better. At the present time there was a coffee-coloured staining of the skin of both lips, very much as if a brush of pigment half an inch broad had been swept rather clumsily round the orifice of the mouth. It was for this disfigurement that help was chiefly sought.

DISCUSSION.

Dr. MacLeod said he believed that the original trouble was a streptococcic perlèche and he considered that the pigmentation might quite well be accounted for by the irritation of the inflammatory condition and the treatment to which it had been subjected.

Dr. F. Parkes Weber thought that the peculiar shaped area of pigmentation about the mouth must be the result of a chronic irritation. In people of very dark complexion like the patient, pigmentary changes were, of course, much more easily produced than in ordinary people.

Multiple Inclusion Cysts of the Epidermis.

By E. G. Graham Little, M.D.

The patient, Mrs. A., a widow, aged 66, with her home in Shipley, Yorkshire, where she had been resident for many years, and had carried on a business. She was a small, thin, but active woman, with two grown children now aged 33 and 35 respectively. There was no history of family disease, except that a brother of hers had died of consumption, aged 23, many years ago. Her husband had died of cancer of the stomach ten years before the beginning of her skin affection. She was sent to the exhibitor by Dr. Thornton, of Shipley, on June 24, and had not been seen again by Dr. Thornton until she came to the meeting of the Section on July 15. Her history was as follows:—

Some three years ago her hair had begun to give her some trouble; it had long been white, but about this time it seemed to suffer from an arrest of growth so that it remained short over the greater part of the scalp, the individual hairs not exceeding ¼ in. in length, but nowhere was there any deficiency of hair in the sense of causing baldness, though she now wears a wig. About two and a half years ago she suffered for some time from diarrhœa and she wasted a good deal. The tumours began to appear about this date, at first on the anterior border of the axillæ and on the neck. They had become more abundant of late, but ever since their first development they seemed to have become progressively more numerous. They had always been themselves moderately irritating, but in addition she appeared to have had from the beginning frequent attacks of a very itchy urticaria. She said she had grown much thinner in the last two months, but there was no ascertainable general illness to account for this. The thyroid was notably enlarged, and the increase had been observed for about eighteen months. There was no tangible enlargement of lymphatic glands. There was considerable pigmentation of the skin in the areas where the tumours were most numerous, and where itching was severe, and this symptom, and the fact that she had taken arsenic for prolonged periods, might account for the deepened colour. There were no uterine discharges. The teeth were defective and decayed, and the mouth in a somewhat septic state. The mucous membrane was not pigmented.

Character and distribution of the tumours: These were evidently in the substance of the skin and freely movable with it. The individual lesions were very uniform in size and appearance, and might be described as "pearly" swellings, with something of the aspect and size of boiled sago grains. In several instances a patent orifice was visible to the naked eye at the summit of the swelling, and from this opening cheesy matter could be squeezed, or from the larger and more patulous tumours a hard horny brown mass could be extruded. One of the larger tumours, about ¼ in. in diameter, which represented the limit of enlargement, was incised and a thick white cheesy matter was voided, which when dry formed a brown horny mass, like the plugs extracted by the patient, of which she was able to supply a small collection which she had thus squeezed out for herself. The tumours were symmetrically distributed and were very closely grouped together, so that whole sheets of skin seemed involved, and presented a coarsely "hobnailed" aspect, and the skin itself was notably thickened in these parts, notwithstanding that the distributioned was in positions where the skin was normally thin. In a very few instances suppuration appeared to have taken place in individual tumours, leaving bluish stains, such as might result from boils. The principal seats of distribution were the axillæ where they first appeared, and where the anterior borders and the sides of the chest below the armpit were crowded with small swellings; the flexor surfaces of both upper arms from the axillæ to the bend of the elbow were studded with small growths, in most cases the colour of the surrounding skin, in others of a pale cream tint, in a few instances of a bluish hue. The skin of the abdominal wall in the hypogastrium and pubic region was similarly studded with very small pearly tumours, in the latter position the skin was deeply pigmented, as it also was on the upper and inner parts of the thighs where there were many small swellings, and there were sporadic small elevations in the popliteal spaces on the fronts of the legs, and on the neck, in both of which positions there was much pigmentation; there were a few isolated tumours on the forehead at the junction of the skin and scalp. The back of the trunk was entirely free, and in fact the extensor surfaces were generally exempt, the only exception being the forearms, where on the outer and upper part from the elbow to the junction of the upper and middle third of the forearms there was a particularly thickly distributed eruption of small tumours. The total number of tumours thus present on the whole body aggregated several hundreds.

The skin was everywhere dry and markedly non-greasy. The hands showed several "Heberden's nodes." The hair in the axillæ and pubes was not arrested in development as it was in the scalp, and was in no way deficient. The nails were normal.

Microscopical examination: A portion of the skin was excised from the flexor surface of the right upper arm, fixed in formalin

FIG. 1.
Multiple inclusion cysts of the epidermis.

and cut in paraffin. It would give an idea of the size and closeness of setting of the tumours to mention that the section in the paraffin block measured exactly 10 mm. in length, and in this strip of skin there were three cysts plainly visible to the naked eye, each being from 1 to 3 mm. in diameter, of a light buff colour, and showing an onion-like stratification, the whole tumour being deeply situated for the most part, and separated from the horizontal line of the surface by at least a millimetre. Under a low power, the section

was seen to contain three cysts, of which the central one communicated directly with the surface by an aperture which was partially blocked with horny cells and granular débris. The epithelial lining of the epidermis was continued directly into the cyst cavity, which was almost entirely filled with a mass of stratified material staining exactly like the stratum corneum. There was no flattening of the papillæ over the cysts. There were no hair-follicles or sebaceous glands seen in any part of the sections examined. The sweat glands appeared normal, but thrust downwards by the bulk of the cyst, and were found for the most part bunched together outside and at the deeper margin of the cyst. In several places, and especially in the neighbourhood of the deepest end of the cyst, there was considerable inflammation apparently round these glands which were embedded in a fibrous and cellular envelope. But the glands were nowhere dilated, and this apparently inflammatory reaction was seen in collections of glands remote from the cyst wall.

With higher magnifications the following details could be made out: The stratum corneum was thickened throughout the section; the stratum granulosum was normal; the rete was in no way altered or thinned, the prickles well marked. At the junction of the epidermis with the orifice of the patent cyst the epithelium suddenly altered, to lose its prickles, to become less than half as thick, to lose its interpapillary prolongations, so that the wall had for its outer boundary a continuous outline uninterrupted by projections. In no part of the cyst wall was there any default of the epithelial coat, but it was of varying thickness, for at its upper margin nearer the line of the epidermis it was in parts very nearly as thick as the normal epidermis covering it; in the greater portion of the wall the cells were several layers thick, it was true, but still less than half as thick as the normal epidermis. Nowhere in the envelope were there any glandular vestiges, or hair tissue. Nearly all round the cyst between the corium and its containing wall there was a definite lacuna, possibly artificial, as the contents of the cyst were very hard. At several places in the line of the outer cyst wall the corium was retained in contact with it by some organized fibrous tissue, with a very cellular corium surrounding it. The inner wall of the cyst was lined throughout with a thin layer of stratum corneum, separated by another lacuna from the great mass of horny tissue which filled the cyst cavity. This mass was for the most part homogeneous horn-cell tissue, arranged in concentric strata like the layers of an onion. In the case of the patulous cyst

this mass was continuous with the mass partially occluding the aperture, and the whole mass both at the orifice and within the cavity was permeated with very numerous cocci. These were not found in the smaller and non-patulous cysts. Probably, therefore, these were really closed cavities, not communicating with the surface.

The epithelial cells constituting the cyst wall showed elongated nuclei in the inner layers bounding the cavity, and kerato-hyaline granules were present in them. The outer layers showed more rounded nuclei, the outermost differing but little from normal epidermal cells, except that prickles were nowhere visible. The contents of one of

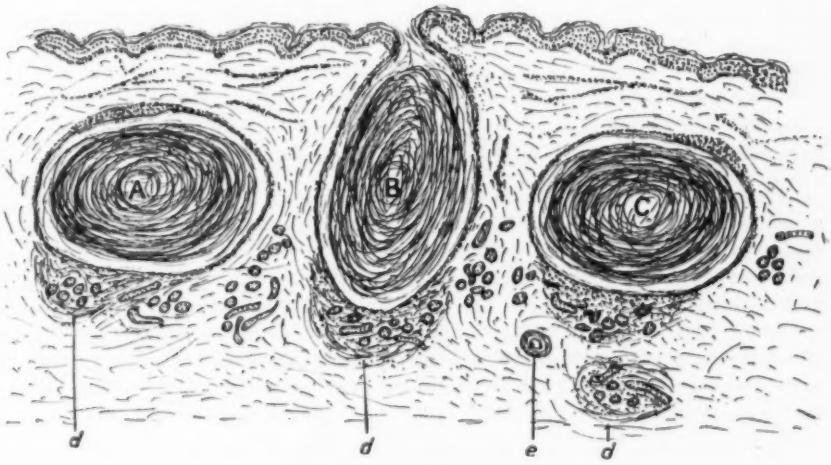


FIG. 2.

A, C, epithelial cysts, not patulous; B, epithelial cyst opening directly on epidermal surface; *d*, collections of sweat glands, surrounded by much fibrous and cellular tissue; *e*, section of blood-vessel.

the cysts which were evacuated by incision were examined. The bulk of the extruded matter was insoluble in chloroform, and when teased out in potash was seen to be chiefly composed of epithelial cells. A few cholesterin crystals were seen in the débris. Some fat was extracted by the immersion in chloroform, and stained characteristically with osmic acid. The cheesy matter, white when freshly expressed, soon dried, to form a hard brown horny plug.

DISCUSSION.

The PRESIDENT was not conversant with the recent literature on the subject of what Dr. Graham Little called "implantation tumours," but the case and the section exhibited reminded him of a very similar condition described by himself in 1899 under the name of *Steatocystoma multiplex*.[1] The paper referred to contained a note of an apparently identical case described by Bosellini, of Bologna,[2] and of a somewhat similar condition described by Dubreuilh, of Bordeaux.[3] Probably the recent views on the pathology of these apparently identical or allied conditions were much nearer the truth than the older conceptions.

Mr. WILLMOTT EVANS did not venture to give an exact opinion as to the nature of these tumours, but thought it a pity to apply the name "implantation cysts" to them. Implantation cysts had a definite and well-recognized nature and origin. They were due to trauma and to masses of epithelial cells being carried into the derma. In the majority of such cases the history was quite clear, as was also the nature of the lesion. He did not believe Dr. Little suggested that in this case the cysts were due to the carrying in of epithelium from the surface; therefore it seemed a pity to use the term.

Dr. ADAMSON thought the tumours might be appropriately called "inclusion cysts," for the sections under the microscope showed them to be cysts formed by recent infoldings of the epidermis and not embryonic hair-follicles, sebaceous glands or sweat ducts or glands, as in tricho-epithelioma, sebaceous adenoma, and syringoma. In parts of the section a commencing infolding of the epidermis could be clearly seen. Similar cystic formations simulating sebaceous gland tumours were seen in some cases of linear nævus (Haldin Davis, case with drawing of section),[4] but Dr. Adamson had not seen any case quite like that now exhibited by Dr. Little.

Dr. MACLEOD said he had examined the section and agreed with Dr. Little's view as to the histology.

Mr. MCDONAGH said he thought it was a case analogous to linear nævus, in which some of the cysts had developed in the openings of the sweat ducts and the pilo-sebaceous follicles. In his opinion, implantation cysts and inclusion cysts were mechanically formed by inclusions of the epidermis, and were not uncommonly met with after burns and in epidermolysis bullosa.

Dr. GRAHAM LITTLE, in reply, said that the President was of opinion that the case showed some clinical resemblance to a very remarkable disease in

[1] *Brit. Journ. Derm.*, 1899, xi, p. 381.

[2] *Arch. f. Derm. u. Syph.*, 1898, liv, p. 81.

[3] *Arch. Clin. de Bordeaux*, 1896, p. 191; and *Trans. Third Internat. Congress of Derm.*, 1898, p. 818.

[4] *Proceedings*, 1910, iii, p. 105.

a male patient described by him in which the microscopical appearances of the cysts there present led to their being identified as sebaceous in origin. This was particularly interesting in connexion with the present case, in which the writer was inclined from the clinical symptoms alone, and especially from incision of a tumour appearing to result in the extrusion of what was extremely like sebaceous secretion to the naked eye, to regard the tumours at first as sebaceous cysts, although the distribution was in parts where sebaceous glands were not particularly in evidence, and their absence in typically sebaceous areas rendered this identification unlikely. Perusal of the President's paper had convinced him that the distribution and general clinical character of the tumours in Dr. Pringle's case were remarkably like these factors in the present case. But differentiation was established by the demonstration in Dr. Pringle's case of enlarged sebaceous glands in the vicinity of the cysts, by the presence of fragments of sebaceous gland tissue adhering to the cysts, and by the complete absence of horn cells within the cysts. For it was expressly stated that the epithelial wall of the cyst "never resembled in appearance the upper epithelium of the epidermis, nor showed any tendency to become transformed into horny epithelium, and that the contents of the cysts were dissolved out by ether." Dr. Pringle gave a reference to a case similar to his own described by Bosellini. Dr. Little had not had access to the original description, but judging from Dr. Pringle's description this could also be differentiated completely from Dr. Little's case. Similarly, there could be no question of the derivation of the cysts in the exhibitor's case from sweat glands or from hair-follicles, and the demonstrable continuity of the cyst wall with the surface epithelium of the epidermis, and the filling of the cavity of the cyst with stratified horn cells, left no option save to regard them as inclusion cysts, admirably described by Darier in his article on tumours in the "Pratique dermatologique" under the title "kystes traumatiques epidermiques." These were the same type as the "implantation cysts" of surgical text-books, and might be supposed to be produced by the transfer through injury of a fragment of epidermal tissue into the corium; there the fragment grew, usually forming a closed cyst, but continuity of the interior of such cysts with the surface epidermis had been demonstrated previously. The chief difficulty in accepting this explanation in the present case lay in the complete absence of any history of injury, the enormous number of cysts present, and the position of these. It had been suggested that this case might be explained on the supposition that these tumours were really of congenital origin, that was, dermoid cysts, the late eruption of which might be determined by some unexplained stimulus. But the history, to the effect that all the tumours made their appearance for the first time after the patient had passed her sixty-third year, seemed to negative such a hypothesis, which was also quite out of accordance with the multiplicity and distribution of the growths. Implantation cysts were rare in any position, were almost always either single or at the most very few, and with one or two exceptions had been confined exclusively to the hands and the iris; a generalized eruption

of such cysts had not been hitherto recorded, so far as he knew. But instances had occurred in which injury had not apparently preceded their appearance, and as Darier stated that as long an interval as twenty-four years might separate the trauma from the development of the tumour resulting from it, it was obvious that the injury might be forgotten in that long period. Rollet[1] had cited a most interesting example of such a cyst appearing fourteen years after injury, in which the growth recurred twice after it had been apparently completely excised. Le Fort,[2] whose work on this subject was the fullest that the exhibitor had been able to consult, remarked on the extreme rarity of inclusion cysts in parts other than the iris and the hand, and stated that the connexion with injury was far from established, so that he preferred for them the title of "acquired dermoid cysts." He offered no example in his own experience or from the literature of *multiple* cysts of this nature. He explained the absence of glands and hair-follicles in the cyst wall by the assumption that if only the upper zone of the epidermis was displaced, which on experimental and clinical data he showed was much the commonest event, the cyst-wall would contain only epidermal cells. If a thicker section of the skin with its appendages was buried in the deeper tissues, papillæ, glands, and even hairs might be present in the cyst-wall, and he mentioned a personal observation in which a single hair was thus demonstrated within the cyst. He thus made out two classes of this type of cyst, depending on whether the invaginated fragment contained or did not contain the skin appendages in addition to the outer epidermal zone. For the production of the purely epidermal variety very much less force, very much less obvious injury, might suffice; and as in the present case the cysts were throughout of the purely epidermal type, it was possible that an explanation of their production might be found in the fact that the patient had been accustomed to scratch herself to the point of mutilation, having apparently suffered very frequently from severe urticaria.

Atrophic Sclerodermia and Sclerodactylia, with Nodules of Calcification about the Left Shoulder.

By G. F. Stebbing, M.B.

The patient was a woman, aged 70, with general sclerodermia. It was the first case of which he could find any record of such extensive calcification as this patient showed. A skiagram showed there was a continuous chain, starting at the lower part of the axilla and extending in a horseshoe shape round the upper end of the humerus, becoming

[1] Rollet, "De l'apparition tardive des kystes dermoïdes," *Gaz. hebd. de Med. et de Chir.*, 1889, 2 sér., xxvi.

[2] Le Fort, "Kystes dermoïdes traumatiques," *Rev. de Chir.*, 1894, xiv, pp. 1013-36.

Skiagram of the right shoulder region in a case of atrophic sclerodermia, showing large calcareous masses in the subcutaneous tissues.

superficial over the deltoid and reaching down as far as the insertion of that muscle. The mass was at first regarded as a calcification of the capsule of the shoulder-joint, but the skiagram showed that this was not the case. The contents of the nodules had not been examined.

Skiagrams of the hands showed marked atrophy of the phalanges and pathological dislocations of the middle phalanx of each little finger.

Dr. F. PARKES WEBER said that, considering how long the disease had been going on, the nutrition of the patient's feet was still remarkably good, and good pulsation could be felt in the dorsalis pedis artery in both feet. There had been many cases of sclerodermia recorded associated with calcification in the skin and subcutaneous tissues, especially in the fingers, but he believed that this was the only case in which that particular part—namely, the region of the left shoulder—had been affected by calcification. In the present case that was apparently the only part affected by calcification, but its amount was very great.

Peculiar Zoniform Nævus of the Right Upper Extremity.

By G. F. STEBBING, M.B.

B. L. M. W., AGED 32, had a number of discrete hard nodules, slightly pigmented, on the right forearm and arm, more marked on the extensor than on the flexor surface. The nodules had been present since birth, and they did not appear to follow closely the distribution of any cutaneous nerve. They had never caused any trouble. It was hoped that a section of one of them would be shown later.

DISCUSSION.

The PRESIDENT expressed some objection to the term "zoniform" as applied to the case, which was merely unilateral. The tumours closely resembled leiomyomata, and the same idea had occurred to Mr. McDonagh. Perhaps Dr. Stebbing would furnish microscopical evidence of their nature before the publication of the *Proceedings*.

Dr. F. PARKES WEBER said he believed that, when Dr. Stebbing had kindly shown him the case at the Lambeth Infirmary, he had suggested that a biopsy examination might show the little tumours to consist of unstriped muscle tissue—i.e., to be leiomyomata. Surely, however, in this case they constituted a kind of "nævus unius lateris," or systematized nævus, even if not a true zoniform nævus.

Mr. MCDONAGH agreed that it was impossible to make a diagnosis without a biopsy; but, tentatively, he would regard the case as one of leiomyoma cutis.

Dr. GRAHAM LITTLE said that from the colour of the lesions there might be a remote possibility that it was an example of urticaria pigmentosa, which he had seen in very restricted distributions. But obviously no diagnosis could be established until the histology had been investigated.

Note.—No biopsy (as suggested by Dr. Pringle) has yet been done on this patient, but it is hoped that one will be done shortly, and the nature of the tumours will be reported on a subsequent occasion.

Case of Lupus Erythematosus.

By H. W. BARBER, M.D.

THE patient, a middle-aged woman, was well until her twenty-fourth year when she developed myxœdema, and was treated for it with thyroid for eight years. She improved on it, and remained well as long as she took the drug. In August, 1899, while at St. Anne's-on-Sea, her face became very irritated and sore. It was treated with ointment and cleared up, with the exception of two patches, one on each cheek. These gradually spread until, in 1902, she was treated by a German doctor by means of Unna's plaster. On this treatment she made a rapid improvement, and the eruption cleared, leaving two slight scars. Four years later it returned, but on the right side only. In 1906 she was married, and in the beginning of 1907, when pregnant, she went to the Norwich Hospital, where her face was treated with X-rays, but it did not get better. The patch continued to spread, and in July, 1913, it was cauterized with trichloracetic acid. The hair then began to fall out. Last Christmas spots appeared on her hands, and were treated at Norwich by means of X-rays; but, according to the patient's story, her hands had been worse since she had the X-rays. During that time, until a week before Dr. Barber saw her—a month ago—she was taking large doses of thyroid. When he saw her in the out-patient department, he thought it was lupus erythematosus, and he believed the X-ray treatment had made the condition much worse. Dr. Williams had told him he had a case like it, which cleared up under sour milk treatment; and he would be glad to hear whether any other member had had similar experience with this type of case. The von Pirquet reaction was negative.

He was much indebted to Sir Cooper Perry for giving him permission to show the case.

DISCUSSION.

Dr. STOWERS considered that the case was certainly lupus erythematosus. In his opinion X-ray treatment was inappropriate and calculated to aggravate the disease. He saw in consultation about three years ago a somewhat similar case, which had assumed an acute form under X-ray treatment, and rapidly extending, ended fatally. He regarded the present case with considerable apprehension and recommended absolute rest in bed with a sedative local treatment. He asked whether the urine had been recently examined and with what result.

Dr. PERNET said he had seen cases of lupus erythematosus aggravated by the application of X-rays. He did not like the look of this case, which was certainly one of lupus erythematosus. He had also intended to ask whether there was albumin in the urine. He would advise sedative local treatment, and quinine internally; the local treatment first.

Dr. SIBLEY said he had long since given up the use of X-rays for lupus erythematosus. Cases of this kind he always treated by painting them over about once a week with acetone and CO_2, very lightly, for a second or two, using calamine or other sedative lotion in the intervals. They all did very well under that. He did not limit it to cases which were localized. He had recently had in the hospital both a man and a woman with the whole face and ears and crown of the head practically covered, producing extensive alopecia, and some superficial excoriation. He painted one side one day, and the other side another day. Both left the hospital in a month with the condition practically quiescent.

Dr. DUDLEY CORBETT thought that for small localized patches of lupus erythematosus the X-ray was sometimes good treatment; but his practice lately had been to treat those cases first by ionization with zinc, followed immediately after by a small dose of X-rays. It seemed to be the most successful treatment hitherto employed, and the results obtained were better than those following the use of either method separately. He had used the CO_2 paint, but on the whole did not think that it was as useful as the method he had just described.

The PRESIDENT said he agreed with the diagnosis of Dr. Barber, Dr. Stowers, and others. He believed the extreme acuteness of the case was due to the application of X-rays. He had seen a similar accident on more than one previous occasion. Nevertheless, he had seen cases of erythematous lupus of the "fixed type," in which the lesions were very clearly demarcated, improve markedly under mild X-ray treatment, apart from ionization. He knew of Dr. Corbett's success by his combined method. He regarded the case as one of great gravity, and it seemed to him to call for very large doses of salicin, or quinine. He usually gave quinine the preference.

Dr. BARBER replied that the patient's urine was normal; the fæces had not been examined.

Note. — Shortly after being shown at the meeting the patient's condition became considerably worse. Her temperature rose and remained in the neighbourhood of 103° F. for several days; there were also several shivering attacks. At the same time the eruption spread considerably. Bacteriological examination of the fæces gave a pure growth of streptococci, and this on a medium which favoured rather the growth of the *Bacillus coli* group of organisms. Her urine showed a trace of albumin and indican. Further investigations of the fæces were being made.

Cases of Annular Lichen Planus in Two Sisters.

By H. C. SAMUEL.

Case I.—Patient, A. E. B., a married woman, aged 60, with five children, all in good health, came to the Prince of Wales's Hospital, Tottenham, last March, with ringed lichenoid eruptions on the limbs, diagnosed by the exhibitor as lichen planus annularis. Her skin trouble began at the age of 17, with a similar eruption; it lasted for about twelve months, and recurred less severely a short time afterwards. Ten years ago she had another attack lasting three months. The present attack at its commencement involved the whole of the arms and legs; it had now practically disappeared, leaving definite pigmentation. During her first attack she was under the care of Dr. Tilbury Fox, as an in-patient at University College Hospital for two months, and afterwards attended as an out-patient. The patient stated that she was exhibited by Dr. Fox at the Clinical Society of London, and that her case was described as lichen ruber.[1]

Case II.—A. H., aged 42, sister of the first patient, had a ringed eruption on the limbs and trunk. The appearance of the lesions was identical with those present in her sister. This was her first attack; it commenced last November, but was now subsiding.

Both patients came to the Hospital independently of one another and on different days. Later they happened to come on the same day, and only recognized each other as the result of a conversation while waiting.

The principal points of interest consisted in the annular atrophic

[1] *Trans. Clin. Soc. Lond.*, 1872, v, p. 154.

type of the lesion; its probably unique co-existence in two sisters, and its identical distribution and characteristics in both patients.

Mr. Samuel asked for a confirmation of the diagnosis of lichen planus annularis, and said that the lesions present on the legs in the second patient suggested the possibility of parakeratosis variegata.

DISCUSSION.

The PRESIDENT said these cases were, to him, of extreme interest. He did not remember that Tilbury Fox had described circinate lichen planus, though doubtless he recognized it, because he saw the elder of these two patients. He was under the impression that circinate lichen planus was first described by Unna about the year 1885, and that he (the President) was one of the first to show examples of it before the Dermatological Society of London. Many members would not then accept his diagnosis because the lesions were circinate, and regarded his cases as syphilitic. His own diagnosis turned out to be accurate. He had no experience of the disease occurring simultaneously in two sisters, and could advance no views to account for it.

Dr. GRAHAM LITTLE said he had seen attacks of lichen planus occurring nearly simultaneously in two sisters, who had suddenly lost their father and were thereby plunged into comparative poverty, and the eruption was ascribable to shock and general stress. He drew attention to the frequency with which circinate types were occurring at the present time, when they were seeing a most unusual number of cases of lichen planus, a frequency of the disease probably to be explained by the period of anxiety in which they were living.

Dr. STOWERS said that he also remembered having seen two sisters who were the subjects of lichen planus simultaneously. One of these, the less acute, was treated with arsenic, no vesiculation having appeared; but the other developed a number of small vesicles, no arsenical preparation having been administered.

Mr. SAMUEL replied that he did not consider the fact that both sisters had lichen planus as a mere coincidence, because not only was the same disease present, but the type of the disease in both was identical—namely, the circinate atrophic variety—in itself much rarer than the ordinary papular lichen planus.

Case of (?) Angioma Serpiginosum in a Woman.

By E. G. GRAHAM LITTLE, M.D.

THE patient, a middle-aged woman, had a large family, and worked hard. Rather more than twelve months ago she had begun to note a pigmentation of the ankles and lower part of the feet, and

this pigmentation had spread in the last few months up the thighs, until at the present time there was a meshwork of a light brick-dust colour, occupying the skin of the legs, thighs, and lower abdomen. The pigment was apparently produced by a sort of natural tattooing with a fine granular pigment, probably blood pigment, and distributed in the path of the superficial plexus of vessels. There was no history, and there were no symptoms of varicosity, in which condition a granular pigmentation was not uncommon. The wide extent, the retiform distribution, and the rapidity of later spread were features of the case. The patient suffered also from some obscure pains in the limbs, and gave a history of an old facial paralysis, which had left a ptosis of the right eyelid.

Note. — The pains were described by Dr. Harris, who had kindly examined the patient since her exhibition at the meeting, as due to rheumatic conditions, and he reported that there was no obvious constitutional illness.

DISCUSSION.

Dr. CORBETT asked whether the pain which the patient suffered was not an unusual complication of this condition. It suggested to him some form of circulatory stasis.

The PRESIDENT said the two conditions might be interdependent on a common cause. He asked whether the blood had been examined, and if so, with what result. It was a point of importance, as the patient was obviously very ill and the skin condition was progressive.

Dr. F. PARKES WEBER asked whether pigmented cases of similar type had not been described under the name "Schamberg's disease." He did not refer to the bright-red cases of "infective angioma" or "angioma serpiginosum."

Dr. PERNET asked if there was any syphilitic element in the case, because some writers laid stress upon that. A girl he had shown at the Section, who was the subject of angioma serpiginosum, had appeared to improve on mercury, but he had not seen her lately.

Dr. GRAHAM LITTLE, in reply, said he did not pay much attention to the pain, as it did not seem to be more than was usual with hospital patients who led hard lives. He did not believe enough was known about Schamberg's disease to discuss it usefully. He remembered seeing, when he was Dr. Pringle's assistant, a boy with Schamberg's disease of the legs, and that was the only case in which he got a section for histological examination. The clinical features of the cases shown as Schamberg's disease were very much like those in this case.

Case of Dysidrosis and Dystrophy of Nails in a Patient with Graves's Disease.

By S. E. Dore, M.D.

The patient, a young woman, aged 23, had suffered from Graves's disease for three years, with marked enlargement of the thyroid gland, tachycardia, and fine tremor, but no exophthalmos. During the same time she had also had intermittent attacks of typical cheiro-pompholyx and dystrophy of all the finger-nails, which were deeply pitted and slightly separated at the free extremities, some of them having been shed and grown again. Atrophy of the nails had been recorded in connexion with Graves's disease by Grainger Stewart and Gibson.[1] These changes, which were stated to have been present for one year only, might be independent of the general condition, or might be associated with the cheiro-pompholyx, but as far as he knew there were no changes in the nails associated with dysidrosis, although such changes might be expected to occur if the disease was, as some thought, a variety of eczema. The sweating associated with the other symptoms of Graves's disease might be a causal factor in the dysidrosis in the present case. She had had three attacks of this eruption of the skin during the seven months he had known her, and she had had many attacks before that, principally in the summer months. The feet were not affected.

DISCUSSION.

Dr. Graham Little said a friend of his, a physician to a London hospital, had suffered yearly for many years from dysidrosis, and as he was a man of very exceptional experience and of trained observation he had contributed some interesting personal points. In all his attacks he had shown, as well as the usual eruption on the hands and feet, very curious circinate erythematous lesions not unlike erythema iris on his body. He had formed the personal opinion that the eruption was associated with intestinal toxæmia, and had found that he had obtained greatest relief from a calomel purge.

Dr. F. Parkes Weber said he did not think the condition of the finger-nails had any direct connexion with Graves's disease. As the patient said she had had the nail condition for a period of only one year, and had had the cutaneous trouble in the hands for about two years, the state of the nails was probably only a manifestation of the dystrophy of the skin of the hands.

[1] *Edin. Hosp. Reports*, 1893, i, p. 196.

Dr. PERNET said he believed nail changes had been observed in connexion with Graves's disease, but similar nail changes might be due to various causes.

The PRESIDENT said the nail changes must be regarded as tropho-neurotic, and any tropho-neurosis might apparently be associated with Graves's disease—e.g., alopecia areata. He believed that nail changes of a degenerative nature had been reported in association with Graves's disease.

Case of Sclerodermia.

By DUDLEY CORBETT, M.D.

THE patient was a married woman, aged 54. There was nothing of importance in the family history. She had had two children, who were quite healthy, and had not suffered from any previous illness. There was no history of syphilis. The menopause occurred three years ago. About eighteen months ago she noticed that her fingers felt very cold and that sores formed frequently round the nails and on the tips of the fingers. These sores started as small inflamed patches which soon broke down and discharged pus. They were slow to heal, and those at the tips of the fingers though small on the surface seemed to extend deeply.

During the last eight or nine months, she again suffered from the coldness of her fingers accompanied by the formation of sores, but the condition was worse than it was during the previous winter and was associated with gradual swelling of the fingers, which when cold became almost black in colour. At the same time the right hand and then the arm began to get stiff, the skin becoming hard, swollen, and somewhat pigmented. This process rapidly spread to the skin of the chest. Further, she had for the last six months noticed an alteration in her facial appearance and some stiffness of the skin of the face.

She had lost a good deal of weight lately and had felt lassitude and disinclination for work. Her hair, which began to turn grey at the age of 25, had been coming out rather excessively. During the last winter she had been troubled by frequency of micturition, having usually to get up once or twice in the night.

On admission to St. Thomas's Hospital she presented the appearance of a symmetrical sclerodermia involving the arms, chest, neck and face, the remaining skin being normal. The temperature was normal

or subnormal, and beyond the condition of the skin no morbid physical signs were detected in the chest or abdomen, nor apart from the dulling of sensation over the affected areas was there any demonstrable change in the nervous system. Her general condition was good except for slight nervousness, and apart from the stiffness caused by the condition of the skin she complained of nothing but some slight itching. The hands were stiff, the fingers being kept in a position of semiflexion. The skin was cold and clammy to the touch and slightly cyanosed. On the tip of the fingers could be seen the scales left by the ulceration which occurred last winter. The palms were apparently unaffected. Over the forearms the skin was markedly atrophic and tightly stretched, so that it could be pinched up and did not pit on pressure. It was rough and scaly on the surface. Over the neck and chest the skin also appeared tightly stretched, but its surface was smooth and glossy and the induration was less marked. The skin of the face was generally stiff, the process obliterating the wrinkles and lines of expression, but mastication and deglutition were not interfered with. The forearms and backs of the hands presented a diffuse yellowish-brown pigmentation, which was also present, but to a less degree, over the chest and neck. Small atrophic patches about $\frac{1}{8}$ in. in diameter were scattered about, especially over the backs of the hands and fingers, but there were no definite patches of leucodermia or morphœa. Numerous fine branching telangiectases were scattered over the front of the chest and neck. Perspiration occurred normally over the palms of the hands, but in the regions implicated cutaneous secretions were abolished, and sensation was slightly diminished. The pulse could be felt in both radial arteries and the vessels were not apparently thickened. The blood-pressure was 125 mm. Hg. The thyroid gland was not enlarged, there was no exophthalmos, nor rhythmical tremor of the hands. The urine was acid, its specific gravity was 1010, and it contained a trace of albumin.

There has been no rise of temperature since she has been in the hospital. She was being given 1 gr. thyroid twice daily and massage was applied to the affected parts.

Dr. Corbett was indebted to Dr. J. J. Perkins for permission to show this case.

Dr. PERNET said that sclerodactylia was often preceded by appearances in the fingers resembling Raynaud's disease which ultimately reached the stage of sclerodermia.

PROCEEDINGS

OF THE

ROYAL SOCIETY OF MEDICINE

VOLUME THE EIGHTH

COMPRISING THE REPORT OF THE PROCEEDINGS FOR THE SESSION 1914-15

ELECTRO-THERAPEUTICAL SECTION

LONDON
LONGMANS, GREEN & CO., PATERNOSTER ROW
1915

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Electro-Therapeutical Section.

October 16, 1914.

Dr. W. Ironside Bruce, President of the Section, in the Chair.

Discussion on the Localisation of Foreign Bodies (including Bullets, &c.) by means of X-rays.

Opened by Sir James Mackenzie Davidson, M.B.

When Dr. Ironside Bruce asked me to open a discussion upon the localisation of foreign bodies by means of X-rays, I felt that I ought at once to accede to his request, in view of the immediate interest of the subject at the present time, when so large a number of wounded are returning from the seat of war with foreign bodies lodged in their tissues. As everyone knows, it is a matter of easy accomplishment to ascertain by means of an X-ray examination whether any particle of metal be present in the body or not, but a much more difficult matter to ascertain the exact size, shape, and position of such a particle. A variety of localising methods have been suggested and put into practice, and we may hope to learn something of these from subsequent speakers in the discussion.

So far as my own contribution is concerned, however, I think it will be best for me to confine myself mainly to the method which I introduced sixteen years ago,[1] and which, I may add, has been adopted in the British Army. I have continued to use this method ever since its formulation, and with entirely satisfactory results. With your permission, therefore, I will proceed to give a detailed description of the method, together with some illustrative cases in which it has proved successful. It has been a matter of some regret to me that a larger number of workers have not availed themselves of its advantages, owing to what I can only consider an entirely mistaken idea as to its difficulties. Anything that is worth doing at all, of course, necessitates a

[1] *Brit. Med. Journ.*, 1898, i, p. 10, and ii, p. 1669.

certain amount of time and attention in the first instance in order to learn the method of procedure, but once this method is learned, its application is generally simple. As an illustration I may mention the case of mixed astigmatism in eye work, which involves a considerable amount of labour in order to learn how to correct it, but, when such knowledge has at last been acquired, the practical gain is enormous. The amount of work necessary in order to gain this ophthalmic knowledge is certainly very much more considerable than that required to localise even the smallest foreign body with the utmost exactness by means of X-rays.

Before entering upon a detailed description of the procedure, there are some general principles which it will be advisable to make clear. The method which I adopt has two main advantages: In the first place, the two photographs which are taken of the part, the X-ray tube having been displaced between the first and second exposure in a manner to be explained presently, furnish data for the mathematical estimation of the size and position of any foreign body which is present. In the second place, these same two photographs, properly viewed, give a stereoscopic rendering in vivid relief, showing the exact relative position of the various parts, the only condition being that the observer must possess correct binocular vision. The view thus given to the surgeon is so lucid that from this alone, better accustomed as he is to anatomical projection than to mathematical calculations, he is enabled to estimate the anatomical position of the foreign body with which he has to deal. It is always well, however, that he should be furnished with exact measurements in order to confirm the impression based on the stereoscopic picture, and the facility which it affords for making these exact measurements is the chief recommendation for the method I am about to describe.

The method of precise localisation, while it does not necessarily involve any mathematical formulæ, is based, nevertheless, upon the simple facts of co-ordinate geometry. We are all familiar in our ordinary medical practice with two co-ordinates on a plane surface; in the temperature chart, for example, we have a horizontal line divided into time units, and at right angles to this a vertical line divided into degrees of temperature. The curve between these lines conveys at a glance the fluctuations of the temperature in relation to the time. A given distance at right angles, first from the one line and then from the other, would define the position of any intermediate point. We live in a world, however, not of two but of three dimensions—namely, length, breadth, and thickness—and if instead of measuring our co-ordinates

from two planes we measure them from three planes, each at right angles to the other two, we are able with equal certainty to define the exact position of any point in space. The most familiar illustration is supplied by the corner of a room in which the two walls meet at right angles to each other and to the floor, and any point in the surrounding space might have its exact position recorded by measuring its vertical distances from those three planes.

The application of this principle to the interpretation of the X-ray picture requires some quite simple arrangements. Two wires at right angles to each other and intersecting in the middle must be stretched across a frame, and the fine point on the surface of the anti-cathode or anode of the tube at which X-rays take their origin must be situated exactly vertically, either above or below the point of intersection of the wires. The distance separating the crossing of the wires from this crucial point in the tube must be ascertained, and is preferably expressed in the units of the metrical system. The part of the patient which is to be examined is placed upon these cross-wires, and either ink or, better still, nitrate of silver is used to mark their position upon his skin. One of the quadrants formed by the wires is also marked, both on the skin of the patient by means of the marking medium, and also on the radiograph by placing at the same position a piece of lead wire at the time the exposures are made. In addition to this it is well to take notes of the position of the patient's body, in view of possible alterations of pressure (in the soft parts of the leg, for example). When the limb is in position a horizontal line may be marked upon it, and the vertical distance to the plate may be noted. Reference can be made to this mark when, later, the surgeon prepares to operate.

The tube-holder must be capable of adjustment parallel to one of the intersecting wires, and for the first exposure the tube is moved away from the central position until the anode, still parallel to one of the wires, is opposite a point 3 cm. to one side of the intersection. After the exposure is made, the plate is removed and marked, and, while everything else remains exactly as it was before, the tube is shifted for the second exposure so that the anode, which remains parallel to the same wire, is now opposite a point 3 cm. to the other side of the intersection. Thus, in the interval between the exposures, the tube is moved a total distance of 6 cm., which corresponds sufficiently closely with the average separation of the eyes.

The plates, on being developed, reveal the image of the cross-wires clearly defined on the surface of the part, but, naturally, owing to the effect of parallax, the position of, say, a bullet at any depth in the

tissues appears to have a different relation to the wires in each photograph. It is necessary, therefore, to reconstruct geometrically the relations which existed between the tube and the cross-wires at the time the photograph was taken. On a sheet of tracing paper or some transparent material two lines are drawn at right angles, and the paper is superimposed, first upon one negative and then upon the other, in such a manner that the intersecting lines are in register with the shadow of the corresponding lines in each photographic image. The shadows of the foreign body, which are not identical in the two cases, are traced, and it is also important to mark on the paper in which particular quadrant the shadow of the lead wire appeared.

In order to obtain an experimental replica of the conditions of exposure, the best plan is to place the tracing paper upon a slab of thick glass into which the same two intersecting lines have been cut with a diamond. This is mounted on a small table, and above it is a sliding T-piece, having a central notch at the top which is adjusted so as to be exactly above the point where the two lines intersect. By means of a sliding arrangement, the distance between this notch and the glass stage below is made to correspond with the distance between the anode of the tube and the cross-wires when the photographs were taken. At a distance 3 cm. to the right and to the left of this central notch are a couple of side notches, and, as X-rays suffer no refraction, but travel out into space along linear paths, their course can be faithfully represented by stretched threads attached to these side notches and brought down upon the stage below. Each thread is weighted in order to keep it taut, and the end which corresponds to the destination of the rays is fixed to the eye of a small needle.

The tracing paper having been fixed upon the glass stage in exact register with the cross-lines, the two threads are brought down each to the same definite point—say the centre—of the shadow of the bullet, the one thread being directed to the first shadow and the other to the second. It goes without saying that the shadow of the bullet more to the observer's left must have been produced by the tube when it was in the position more to the observer's right, and vice versa; therefore, the threads must cross each other, and, as obviously the centre of the bullet was situated at some point along the course of the straight lines indicated by the stretched threads, the absolute position must be the point at which these threads intersect.

The next thing to be done is to ascertain the exact distance of the point thus obtained in relation to the three planes. One co-ordinate is forthcoming immediately, for this distance from the crossing of the

threads to the flat horizontal plane below represents the exact depth of the position of the bullet from the part of the patient's skin which rested upon the photographic plate. If then we can imagine the cross-wires to be the base of vertical planes, we may consider a vertical plane to be erected on each of these wire shadows, and may represent it by some form of upright. The distance of the point of intersection of the threads is then measured, first from the vertical plane corresponding to one cross-line and then from the vertical plane corresponding to the other. These two distances are noted in millimetres, and, together with the measurement of the depth, give us all the co-ordinates.

It remains now to transfer our attention to the patient's body, which still bears the marks of the wires, and what is equally necessary in order to guard against lamentable error due to reversal, the identification of one of the quadrants by means of a mark on the skin corresponding with the shadow of a fragment of lead on the plate. The two co-ordinates representing the distance of the centre of the bullet from the two cross-lines are measured on the skin from the respective planes. These calculations give the point immediately below which the centre of the bullet is situated, and the distance, already ascertained, from the crossing of the threads to the horizontal stage below is exactly equivalent to the depth at which the foreign body will be found.

One consideration in connexion with this method is specially pertinent in view of the necessity of locating bullets in a large number of cases returned from the seat of war. It is possible to save both time and expense by using the method just described without a photographic plate at all, providing only that the foreign body is clearly visible on the fluorescent screen. All that is necessary is that the screen shall have a thin glass covering with the intersecting lines clearly indicated, either by a mark on the glass itself or by stretched opaque threads. By means of tracing paper placed in register, and such adjustments of the tube that the distance from the cross-wires can be calculated, a reconstruction of the position may be made, exactly as in the manner already outlined.

An apology is scarcely needed for having entered with such particularity into this method—a method already familiar to many whom I am addressing—since its value obviously depends upon observing accuracy in every detail. It is needless also to point out the various refinements of what is here stated in its crudity, as, for example, that this method enables not only the position of one point in the foreign body to be determined, but also the exact dimensions of the whole of the body, and the angle, possibly very oblique, at which it is lying in

the tissues. Similarly, the method is available for the most accurate localisation of foreign bodies in the eyeball and orbit. The principles here are the same as in the case of a foreign body in the arm or leg, but the special mobility of the eye requires that attention should be paid to certain practical adjustments into which the scope of this paper forbids me to enter in detail. The use of a rifle sight, for example, is a convenient means of ascertaining the central position of the tube in relation to the cross-wires which are resting against the patient's temple. A critical adjustment is the placing of a piece of lead wire or foil on the patient's lower eyelid close to the eyeball, and the working out of the position of this point in relation to the corneal centre. When the usual measurements on the cross-thread localiser have been obtained, it is well to discover the position of the foreign object by taking a model eye, five or more times larger than natural size, and working out the relative distances by means of a surface gauge and pair of compasses.

As I have already pointed out, when the two photographs taken by the localisation method are combined, they form a stereoscopic picture. Stereoscopy alone, indeed, may often be sufficient to reveal to the trained eye the position of a foreign body by the relation which the intruder bears to the bones or to other anatomical details. This supposes, however, not only an intimate anatomical knowledge, but also the possession on the part of the observer of correct binocular vision. Some critical physiological optics underlie the whole question of seeing stereoscopically. The theory of such vision is, briefly, this, that when we have to converge (turn inwards) our gaze in order to see certain objects, we instinctively refer those objects to the nearer position, and when we have to diverge (turn outwards) we refer the objects to a further distance. A theory was current at one time that stereoscopic vision resulted from the very rapid motion of the eyes when focusing two images by convergence and two by divergence, thus conveying to the brain the impression of relative distance. It is possible, that in the course of evolution the stereoscopic faculty of perspective has been built up by means of the movement of the eyes, but the fact that the sense of stereoscopic relief, as conveyed to the brain of the observer, is based upon the relative position of the images on the fundi of both eyes is capable, if time permitted, of very simple demonstration. In this place a note need only be made of the necessity, in any form of stereoscope, that one eye should only see one image, and the other eye the other image.

I may, perhaps, be permitted a few words with regard to the

practical side of stereoscopic skiagraphy, as the arrangements are very similar to those already laid down for the more precise localisation method. In this case, again, the X-ray tube must be displaced between the two exposures by a total distance of 6 cm. (or 3 cm. on either side of the central zero point). The line connecting this displacement of the anodes must be parallel with one edge of the photographic plate, or with some corresponding line across the photographic images. If the tube is placed in the holder for working from above, some sliding arrangement for its displacement is necessary, and in this case a window covered with parchment, such as is used for making drums, is a good material, being able to support considerable weight, and at the same time being very thin, and quite transparent to X-rays. Piano wire across this window, near one of its margins, can be used to indicate the line of tube displacement.

The patient may lie upon a couch, the tube be in position above or below, and the plate be laid upon the part. The upper and lower borders of the plate should be marked with blue pencil on the skin, and it is also of service to fix on the skin a piece of lead wire—shaped as an L, to mark the left side—as an aid to correct registration when viewing the negative afterwards. It may be mentioned here that a convenient means of demonstrating stereoscopically the relation of the skin to the parts beneath is afforded by painting over the skin a little bismuth mixed with weak gum water. The patient must be kept absolutely still while the tube is displaced, one plate removed, and the second exposed in exactly the same position on the patient. Any movement of the subject between the two exposures would lead to false or pseudo-stereoscopic effects.

The two photographs obtained in this way, when viewed stereoscopically, combine in excellent relief. The most suitable arrangement for viewing X-ray stereoscopic transparencies is the Wheatstone stereoscope, but the original negatives can be viewed entirely without apparatus if the observer will take the trouble to learn how to see stereoscopically. For this purpose the two large negatives are placed side by side in correct position against a window or some other means of illumination, and the observer converges his eyes to a point between them. After a little practice he will find the stereoscopic image making its appearance, diminished in size, it is true, but very clear, in the space between the eyes of the observer and the negatives. The double images at either side, which are troublesome at first, can be eclipsed by bringing up the hands laterally from the sides.

The same general principles govern stereoscopic fluoroscopy, which,

it appears probable, will be used in the not distant future much more generally in hospitals than is the case at present. There is, indeed, a considerable field open for some practical and convenient apparatus for carrying out this method. The stereoscopic fluoroscope involves the use, either of a single tube with two anodes, or of two tubes with their anodes in a horizontal line some 7 cm. apart. The patient is interposed between the tubes and a large fluorescent screen, and each tube is illuminated alternately for an instant while the observer looks through some form of eyepiece which eclipses each eye in turn. In order to secure persistence of vision, this cycle of alternations must take place at least ten times per second, and, each tube producing one shadow at a time, and each eye alternately seeing a separate image, the observer is enabled to combine the shadows into a single stereoscopic picture.

The great value of stereoscopy scarcely needs any enforcement, but its application to the localisation of foreign bodies is necessarily limited to the more simple and patent cases. For greater precision one must fall back upon mathematical calculations, but, fortunately, as this paper has attempted to show, such calculations present no very formidable obstacle. The mastery of some such method for ascertaining the exact situation of a particle of metal embedded in the tissues was never more important than to-day, when the surgeon is confronted with batches of cases in which it is necessary to extract bullets and fragments of shell with the utmost dispatch and directness, and the least possible damage to the surrounding parts. There are methods of precise X-ray localisation in practice other than the one upon which I have dwelt more particularly in this paper, and these, doubtless, will find their exponents in the course of the discussion.

I am sure that in the future—and the not very far future—in many hospitals, especially at a time like this, in which there is a rush of cases, if you have a good stereoscopic fluoroscope you will be able to locate foreign bodies, by inspection, with the same certainty with which you can see fruit in aspic or clear jelly, and I hope that some of the younger men will work that out, and thus enable a great deal of time and trouble to be saved. I hope to hear of other methods, perhaps better and simpler than those I have described to you.

Mr. Lockhart Mummery, in response to the President's invitation, said he had hoped to hear other radiographers speak before he dealt with some surgical aspects. He was exceedingly interested in what Sir James Mackenzie Davidson had said, because at the present time it was vital

that there should be some reliable and practical method of localising bullets and shell fragments. He had already, since the war began, had some experience of cases of bullet wounds where localisation was essential, and there could be no doubt that some of them were exceedingly difficult. The method of localisation just described seemed to be a really excellent one if it could be adapted to the cases. He understood Sir James to contend that there should be a steel or plated measure which, if necessary, should be passed down the plane indicated until the bullet was found. But one of the difficulties he had found with bullets at the present time, at any rate Mauser bullets, was that the men wounded by them were not received here until a week or ten days after being hit; so that the best part of a fortnight had elapsed before the bullet could be extracted. By that time the bullet had become surrounded by a mass of fibrous tissue of cartilaginous hardness, under which circumstances a probe was useless. One put the finger in, or passed a probe, and felt something like a bullet, but there was no differentiating as between cartilage and metal. The only means of distinguishing the bullet was by the impact of a knife or needle on the metallic surface. It was most important for the surgeon to cut deliberately straight down to the spot where he knew the bullet was located; hence the importance of localisation methods. The greatest difficulty in dealing with these bullets was that they were often in such very difficult and tiresome situations. One had frequently to decide whether any attempt at removal should be made, owing to the region involved; it might be the anterior mediastinum, or beneath the subclavian artery on the left side, which he would not dream of cutting down upon. Some of the most interesting cases were those in which the bullet, generally a Mauser, had struck some hard object which was in contact with the patient's skin. The effects then produced were curious and often disconcerting from the surgeon's point of view. The bullet struck such an object as a buckle or a sword-belt or sword-hilt—in one case a revolver butt, close up to the belt—and passed through a small entrance wound and then spread widely, in tiny fragments, almost in the same manner as a shell, on a small scale. He had brought skiagrams of three cases on which he had operated recently. In one case the bullet struck the butt of the officer's revolver as he carried it near the abdomen. The entrance wound was about an inch long, and when the bullet got inside it broke up into ten or twelve pieces, mostly casing, but partly lead. Some of the fragments were in front of the hip-joint, some in the groin, some in the thigh. As would be seen by the skiagrams—all of which had been excellently taken by the President—it was not easy to "fish

out" so many pieces of bullet from different regions. Moreover, under the circumstances he had mentioned, the wound was very septic, and large amounts of other material were carried into the wound. In this case a piece of tobacco pouch and a little tobacco were carried in, resulting in an elaborate and complicated type of wound.

A still more interesting case was one in which a shrapnel bullet struck the buckle of a wrist watch. This had an extraordinary effect on the bullet, much of it being broken up into fragments as fine as pepper. He removed twenty-two fragments which approached a reasonable size, but fragments were found to have gone between every tendon and between every nerve. In such cases it was not merely a question of localisation, for it was almost a surgical impossibility to remove every one of the fragments. Yet this man was recovering well, with the exception that a tiny fragment had cut the deep branch of the ulnar nerve, which, of course, could not be repaired.

In another case an officer was struck by a Mauser or shrapnel bullet—he did not know which—on the sword-belt, and the bullet travelled through the wing of the ilium. One piece travelled forward and tore open his sigmoid flexure. Some pieces of bone were driven backwards post-peritoneally, some of them travelling to the other side of the spine. The patient had a fæcal fistula through the wound, and a violent secondary hæmorrhage more than once from the lumbar artery, which was cut close to the spine. He (the speaker) closed the fæcal fistula from the abdomen, and the patient was recovering; but he doubted whether the bullet could be removed, as it could not be reached, except through the peritoneum or through all the posterior lumbar muscles. It seemed that the bullet must be left in situ. Localisation was not the problem there.

Dr. Ironside Bruce had localised every one of his cases for him, and every bullet which had been cut down upon had been found.

Mr. Cooper said he did not feel he could add much to what Sir James Mackenzie Davidson had submitted. For upwards of two years he had been localising foreign bodies in the eye at the Moorfields Hospital, during which period he had had over 300 positive cases, and there had been no complaint of inaccuracies from the staff. The only difference between the localisation of bullets in various parts of the body and foreign bodies in the eye was, that in the case of the eye one was dealing with an extremely mobile organ, which, as Sir James said, one must take particular care to immobilise. And it must be immobilised in a certain position, so that one could say accurately from the

skiagrams where the centre of the cornea happened to be, as the surgeon preferred to make all his measurements from the centre of the cornea. The eye itself, under normal conditions, was transparent to X-rays, therefore some pointer must be used from which the centre of the cornea could be estimated. For that purpose, under Sir James's tuition, he had used a small piece of fuse wire, which he fixed with strapping immediately below the centre of the cornea when the patient looked straight in front of him. The distance below did not matter so long as it was known, and measured accurately, and this was easily done by means of a pair of dividers. One simply measured up the end of the fused wire, and measured the distance from the co-ordinates of the foreign body in situ. He had brought specimen charts which would show how it was carried through.

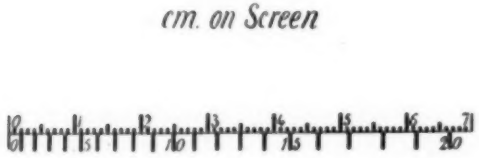
Results could be checked quite surely by making the fuse wire a known length and then measuring the fuse wire in space by means of the cross-thread. If the result was identical with the known length one could feel satisfied that the other measurements were correct.

It had been said that this method of localisation required the employment of a quantity of costly and intricate apparatus; as a matter of fact, one only required a reel of cotton, a reel of iron wire, and a pair of compasses, besides the ordinary things which the practitioner would probably have by him, especially one possessing an X-ray installation. He did not mean that it was not more convenient and handy to have a proper apparatus suitably fixed, but it could be done without, and he had proved it.

Dr. HAMPSON said he did not propose, as the hour was late, to occupy the time of the meeting to any extent. All members of the Section knew of the valuable work of Sir James Mackenzie Davidson in connexion with radiography and the work of the surgeon. All this advance depended on the happy thought by which Sir James adapted to this research the principles used by geometers in measuring, by triangulation, the height of a mountain which was inaccessible, such as was employed to measure the height of Mount Everest. It was now possible to see and measure the depth beneath the surface of a foreign body. All that those who followed Sir James could hope to do in the matter was to follow out the principles in the way which seemed to promise most usefulness in the future. Sir James had mentioned the need for some pains and trouble to be taken, and perhaps the need for a good deal of that had accounted for the method not being more generally practised so far. Surgeons, like other people, were apt to

follow the line of least resistance, and to adopt a simple and handy means in place of a more complicated one. He would show, by means of the epidiascope, a method which he had adopted for the purpose of expediting results, and to obviate a separate calculation for each case. It took the form of a scale.

As Sir James had shown, the depth to be found depended upon the actual depth, the distance of focus from screen, the distance through which the focus was moved, and the distance through which the shadow on the screen moved, between the first and second operations. These were all mutually related. Now, if the distance from focus to screen were kept constant, say at 50 cm., and if the movement of the focus were constant, say at 10 cm., only two factors remained to vary with each other—namely, the depth of the foreign body and the movement



of the shadow. How these varied could be worked out on a drawing-board with a fine pencil in the study more exactly than with strings and weights in the presence of surgeons in a hurry. Moreover, if a number of cases were worked out beforehand, the results could be put on to a scale such as that shown in the illustration. If the two positions of the shadow were marked on the lead-glass cover of the screen, it would only be necessary to put the lower edge of the scale against the marks to read off without further trouble the depth of the foreign body. Without more apparatus than this scale any radiographer could, therefore, give at once the depth of a bullet more correctly than any but the most skilful performers with more complicated apparatus.

A little extension of the scale made it possible to get the results with equal readiness in cases where the distance between screen and focus was not fixed at 50 cm.; so that it would not be necessary to have a couch which admitted of adjusting this distance. Messrs. Newton and Wright had such a scale in preparation.

Mr. SANER said that, as Resident Surgical Officer at Guy's Hospital, he looked on this subject from the surgical standpoint. It was his privilege there to extract all the needles where it was possible to treat the cases in the Out-patient Department. At first, it had been his practice to cut down on the marks made by the radiographer. The use of a local anæsthetic often made the depth greater than it appeared under the rays and much time was spent in searching for the needle, with varying damage to the tissues under dissection. He was glad to hear Sir Mackenzie Davidson state that he considered the removal of foreign bodies one of the most difficult operations in surgery. In submitting the method he had used during the last six months on some thirty cases, he hoped to show that it was more rapid and more certain than the usual method of localising first and operating without the aid of the rays. Most of the needles were removed from the hand. Where the patient could be persuaded to wait for a week to see if all symptoms disappeared without removal, it was found that an operation was often avoided.

The position of the needle was found by rotating the part under the screen and the end nearest the skin marked down. The rays were then turned off and after sterilising with iodine and anæsthetising with a solution of novocain and adrenalin, an incision an inch long was made through skin and fascia. A fine pair of mosquito forceps were then put in the wound with the points closed and the rays turned on. Using the artery forceps as a probe and rotating the limb, it was comparatively easy to make out the relative positions of the needle and the forceps (fig. 1). When the point of the probe was seen to touch the needle the forceps were withdrawn slightly, the jaws opened, and pushed forward again until the needle was seen to lie in the position indicated in fig. 2. The forceps were then closed and moved laterally, so as to make sure the needle had been grasped (fig. 3). Under an ordinary hand lamp, it was now possible to expose the needle by blunt dissection along the handle of the grasping forceps. It was as well to fix another pair of forceps on to the needle before relaxing the first pair, even when a good exposure had been obtained. He claimed that it was possible with some practice to localise the needle and complete the operation in twenty minutes. He had done three consecutive cases in the hour, and he challenged the ordinary methods to compare with this in rapidity.

He would like to know whether all the bullets referred to by Mr. Lockhart Mummery were giving trouble. He (Mr. Mummery) had stated that it was of little use using the probe as in some cases the bullets were surrounded by fibrous tissue. He suggested that in such

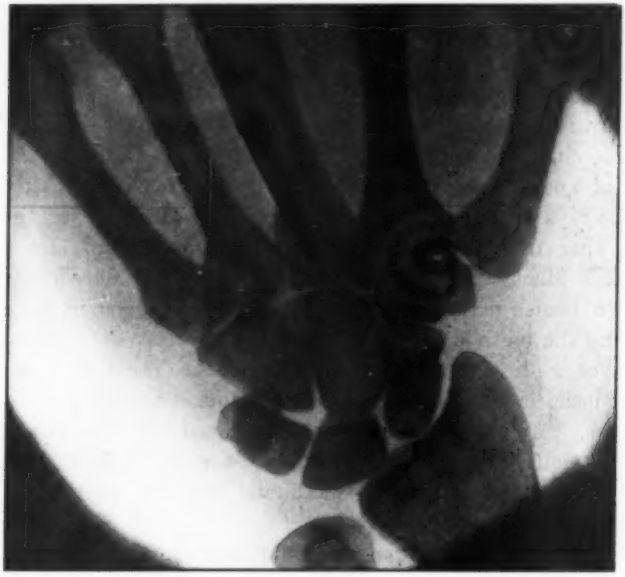


FIG. 1.

Forceps seeking needle.

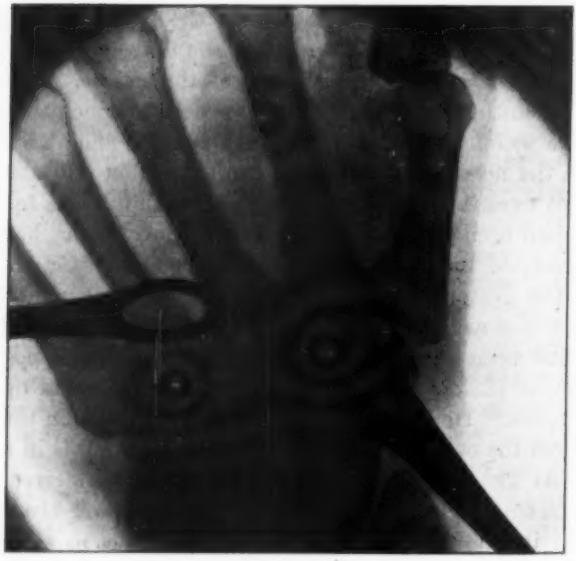


FIG. 2.

Forceps enclosing needle.

FIG. 3.

Forceps grasping needle.

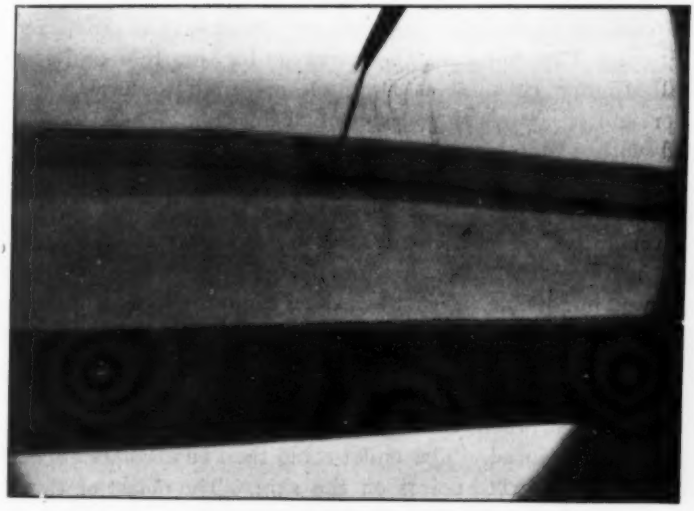


FIG. 4.

Forceps grasping needle.

cases removal was hardly necessary. Foreign substances, such as plates on bones, if applied aseptically, caused no trouble. They, however, soon became surrounded with dense fibrous tissue. If bullets were in a similar state in the tissues, or bones, little trouble seemed to be caused.

Mr. H. N. Eccles, Assistant Radiographer to the Hospital, had been most kind in helping him with many useful suggestions in each case. He wished to associate Mr. Eccles's name with the communication.

The PRESIDENT (Dr. W. Ironside Bruce) said he would like to express at once a warning he had in mind in reference to the procedure adopted by Mr. Saner—namely, the possibility of damaging the skin of his hands by the continual X-rays exposure.

Mr. SANER, replying to the President's remarks, said he had thought of the possible danger to his hands, but he had not, so far, had any trouble. He was attempting to obtain some gloves as protection during the manipulations under the rays. The exposure was very short in any one case. His body was protected.

Dr. BAILEY stated that he had made 350 X-ray examinations of some 550 wounded coming from Mons, the Marne, and the Aisne; all the cases with bullets, shrapnel, or fragments of shell required localisation. The surgeons he worked for at the 2nd Eastern General Military Hospital at Brighton preferred to have an antero-posterior and a lateral photograph of their cases; they were not so satisfied with a stereoscopic view or with a localisation (such as Sir James Mackenzie Davidson's) in which the surgeon had to accept a statement by the radiographer that the foreign body was at a certain depth, vertically, below a point marked on the skin. He used Sir James's method frequently, however, where the surgeons' favourite method was impossible, as in the pelvis, high up about the shoulder-joint, &c. A third method of localisation was extremely useful—namely, using a vertical ray and covering two marked points in front and behind with lead rings, so that the ring shadows and the bullet shadow coincided, then moving the X-ray tube out so that three shadows were produced. The bullet could then be absolutely located as regards the two marked points on the skin. The object of the radiographer should be to produce a mental picture of the position of a bullet so clearly in the surgeon's mind that he searched for it with extreme

confidence, and it was often worth while to prove the position of the bullet by four or five different methods in order to produce that confidence, and as a consequence a successful operation.

Sir JAMES MACKENZIE DAVIDSON, in replying on the discussion, said he felt exceedingly gratified that it had been so interesting. When Mr. Lockhart Mummery spoke about some of the wounds being septic by the time the patients arrived in this country, he did not know whether that gentleman meant to imply that on this account the localisation method was difficult to apply. [Mr. MUMMERY: No.] There were, of course, many details connected with the system which could not be entered into in a single paper; indeed, he feared he had already wearied his audience. With regard to the sagging of the flesh, and the consequent difficulty in arriving at the true depth, he now had a means of overcoming that. In early days he found that in his estimation of the depth of the needle there was a greater difference between that and the depth found at the operation than he could allow for. In one case a lady who ran a needle into the calf of her leg had only one leg, hence particular care had to be taken, and this was not a case in which the foreign body could be left alone, though he agreed there were such cases. As this lady got about on crutches, her one leg was not exercised, and so was flabby instead of firm. When the leg was put down, the flesh collapsed together, and the depth appeared to be less than when the tissues were in a more or less elastic and firm condition. Therefore, when there was a yielding of that kind he took a surface-gauge and marked a line on the surface of the body with nitrate of silver when it was being X-rayed and in this way the absolute depth could be ascertained, however swollen the part might be. With regard to bullets whose effect seemed to resemble that produced by explosive bullets, owing to striking hard metal casing, he had several cases like that in the Boer War, and extraction was very difficult, and could not be done properly. But if the stereoscopic fluoroscope should come to be a practical actuality, these bodies could be picked out with the greatest ease. With regard to the failure of the probe to detect a foreign body, he had an arrangement which he introduced thirty-five years ago and used in a jaw case. A woman in Aberdeen was shot in the face, and the bullet could not be found. Graham Bell had just brought out his telephone, and he (the speaker) took a two-shilling piece (later he used a plate of pure silver) and attached this to the telephone wire, and placed it on the moistened skin of the patient, and as soon

as the probe-electrode which was attached to the other pole of the telephone touched metal in the tissue, a current came through. [Mr. MUMMERY: The difficulty is that the bullet is embedded in cartilaginous tissue, and you cannot get at it.] It was useful to know that one could come down upon it. He agreed that in some cases it was wiser to leave the bullet alone; he had known some disasters from unwise interference. In one case, at Netley, a bullet was localised deep in the mediastinum, and he advised that it be left alone. The man went to Scotland, the country whose inhabitants were noted for their caution; but the surgeons decided to go for the bullet, and the result was fatal. He recently had the case of an officer who was shot with shrapnel. Everything healed up well, but he had violent pain in the abdomen. The localisation of the bullet was found to have been correct, for it was in his gall-bladder. It was removed, and the patient was now progressing well. Dr. Hampson's method of devising a scale, to save time and trouble, was very nice, but he would be interested to know how it could be applied to eye work.

He had a list of disasters where some method of localisation had been employed, and in some, he was sorry to say, no method had been used at all. During the last week he had had four cases in which operation had been tried for removal of a bullet but failed, and the bullet was found in a different location, and yet it was so embedded that it could not have shifted. A very slight difference in the position of the tube might give an erroneous idea of the locality of the foreign body.

He thought this discussion would have served a practical end if it resulted in impressing upon the surgeon the necessity of taking some trouble in this matter of localisation before the patient was placed on the operating table. Half-an-hour spent in this way was far better than ten minutes extra occupied during the actual operation. Whatever method was used, it was always worth while to take trouble.

He wished to thank members of the Section and all present for their kind reception of his paper, and he hoped he had not been wearisome.

The PRESIDENT announced that the next meeting of the Section would be held on January 15, and it would be a clinical evening. He asked for an early intimation concerning material which members proposed to bring forward for that occasion.

Electro-Therapeutical Section.

January 15, 1915.

Dr. W. Ironside Bruce, President of the Section, in the Chair.

Discussion on New Methods for Localisation of Foreign Bodies.

Opened by A. E. Barclay, M.D.

The apparatus I have to bring forward is so simple that I feel some compunction in submitting the instrument I use for localisation. All radiographers base their localising work upon triangulation, a principle as old as the hills; it is a surveying principle which Sir James Mackenzie Davidson was the first to apply to medicine. It depends on the fact that X-rays proceed in a straight line, therefore the shadow cast by a foreign body must lie somewhere on that straight line. If one moves the tube, the shadow of the foreign body on the screen must also move. If one measures the distance that the shadow moves and that from the tube to the screen, one can work out by a mathematical formula the exact distance of the foreign body to the screen (or plate, by making two exposures on the one plate). This entails *exact* readings of very small measurements and a certain distrust of one's figures. I therefore devised a reproduction of the usual diagram by which the whole process will be worked out mechanically, leaving no room for any possible mistake from misreading of figures or errors in calculation.

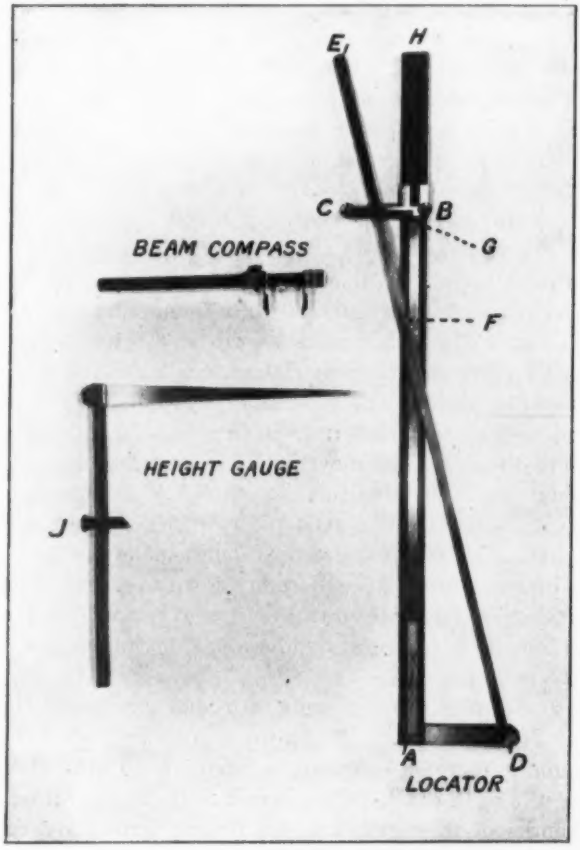
The height of the edge of the couch above the tube centre is a fixed distance, and to this has to be added the extra height of the screen or plate above this point. This is easily done by a right-angled height gauge with a sliding piece, *J*, which indicates this distance on a scale on the vertical arm of the right-angle gauge when the cross-arm is brought down to the plate. The foreign body is located and its position

on the skin marked through a hole in a small fluorescent screen (Captain Holland's device), narrowing the diaphragm to its smallest extent and taking pains that the tube is accurately centred in relation to the diaphragm. The diaphragm is then opened and the tube is displaced a definite distance, 10 cm., and the new position of the shadow is marked on the screen, the first position being indicated by the hole in the fluorescent screen, which has not been moved since the skin was marked through it. For large foreign bodies, in positions where they are quite clearly seen, this is sufficient, but in a large number of cases, especially the more difficult ones, I make two exposures on the one plate, thus obtaining an accurate record.

The BEAM COMPASS, provided with small knife-blade edges facing outwards, is then employed to gauge the movements of the shadow, and this setting of the edges is then applied to the locator. In the LOCATOR the points *A* and *D* represent the two positions of the tube. The line *A H* is the line of the central beam of rays by which the skin mark and first position are made; the line *D E* represents the beam of rays casting the second shadow. The sliding cross-piece, *B C*, is the screen or plate, and this is fixed at the ascertained tube-screen distance by the screw at *B*, the readings in centimetres and inches being marked on the boxwood rule, *A H*, on which the steel slip is mounted. The steel slip, *D E*, moves from the point *D* and can be clamped by the screw at *C*. One blade of the knife edges of the beam compass, which has been set, is placed at the point *G* (the line of the central beam), and the slip, *D E*, is then moved up against the other blade and clamped in position by the screw, *C*. The whole process has now been accurately reproduced, and the shadow must be due to a foreign body lying at the point where the rays cross—i.e., at *F*. All that has to be done is to measure the distance, *G F*. This is done in a moment by expanding the blades of the beam compass between these two points, and this gives the exact distance between the plate and the foreign body.

It is comparatively seldom that the plate or screen is actually in contact with the skin at the point from which the localisation is made. This source of error presents no difficulty if a small piece of metal is placed on the skin close to the skin mark on the same level. Both shadows are then localised and the correction made by subtraction. It is surprising how big an error there is from this source, and how misleading are the results if the plate is tilted in an attempt to overcome the error. If the plate is not horizontal—i.e., in the same plane as the tube move-

ment—there is an even greater miscalculation as the result. Because of these sources of error and the double localisation involved, plates are preferable to screen localisation in all except the obvious straightforward cases.



Instrument for use in localisation of foreign bodies.

The use of the locator is absolutely simple; it can even be done by the light of the fluorescent screen, and the whole process is absolutely mechanical and positive. There are no small measurements to be read, and the results given are as accurate as those of the cross-thread localiser.

DISCUSSION.

Dr. HAMPSON: I wish to refer again to the system of which I briefly spoke at the last meeting of the Section. Having obtained the marks on the screen in the way shown by Dr. Barclay, one notes on the scale the number of centimetres they are actually apart. On the other edge of the scale one notes that the depth of the foreign body is, say, 7. That is one advantage the system I am speaking of possesses over Dr. Barclay's, which, in its essence, was exhibited at a meeting of the Röntgen Society a month ago. It is a useful system, a neat abbreviation of the full-size Mackenzie Davidson system, very correct and handy. And if it were not for the still further advance which disposes of the necessity of having even such an instrument, since one is able to read off the depth directly from the screen, it would be most useful. (Table exhibited.) The system is capable of much further development. Since then, Captain Thurstan Holland has further elaborated that table so as to use any distance between anticathode and screen; or one may elaborate a scale system, such as is shown on the first slide. The vertical line of dots represents the distance of the anticathode from the screen; and the horizontal lines of dots represent the degree of movement of the image upon the screen. One of the merits claimed for this system is the extreme accuracy and minuteness of the observation rendered possible; on the scale one can easily see $\frac{1}{2}$ mm. For very exact work one can have a double impression on the plate, and measure accurately down to $\frac{1}{2}$ mm., whereas most of the charts which might be drawn do not go beyond $\frac{1}{4}$ cm. or $2\frac{1}{2}$ mm. Moreover, the scale is very neat and handy, and can easily be carried in the waistcoat pocket.

I wish to mention some misapprehensions concerning the method. Some say it is very well for rough work, such as finding bullets, but something more minutely accurate is wanted. But I claim for this system that it is most exact, quite as exact as the crossed-thread method, with nine-tenths of the work done beforehand; and the accuracy must be greater than where one is dealing with flexible threads, which may be caught by one another, and may be displaced by the scale with which one is working. But a line drawn by a fine pencil on a sheet of paper cannot be disturbed by a line drawn across it. It is said that the original method has the advantage that it shows the position of the foreign body in relation to fixed points, such as to a bony point in the body. But this method does exactly the same. And if one wishes to learn the possible obliquity of a body, one can ascertain the depths of its

two ends as exactly and thoroughly as by the original crossed-thread method. So, while admitting our indebtedness to Sir James Mackenzie Davidson, I do not admit any falling off in accuracy by the method just described. I wish to say how deep is the debt to Sir James for his method, upon which the other modifications are founded.

Captain THURSTAN HOLLAND: I have no new localisation method to bring before the meeting. The developments which have taken place are all based upon Sir James Mackenzie Davidson's, which, I think all must admit, is the most accurate of all, and must remain so. The

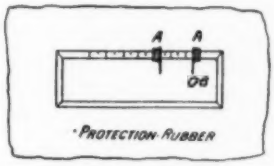


DIAGRAM I.

A A, two movable metal pointers on scale; *B*, hole in glass and screen.

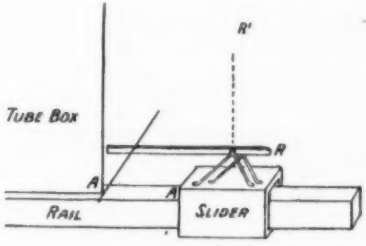


DIAGRAM II.

A A, 10 cm.; *R*, pointer raised to *R'* fixes the slider to the rail.

devices now used are time-saving methods, but they are not quite so accurate as Sir James Mackenzie Davidson's original method. Though in a busy base hospital, with wounded pouring in by hundreds, it is desirable to have shorter methods, the original method is the best. When Dr. Hampson described his method at the last meeting, I felt it was worth the whole journey up to London to hear, and I returned with the hope that I might be able to improve on it. In applying this method it soon became apparent that the large fluorescent screens mounted in large frames were impossible of application for exact work. In many cases these could not be brought into contact with the skin of

the area to be examined, and also could not be kept in position. After several experimental screens the following has been found to be the best. This is a small screen 6 in. by 2 in., and fixed to the back of a very light wooden frame. The screen has a thin piece of lead glass in apposition with its fluorescent surface. At a distance of a little more than 1 in. from one end there is a small round hole right through the

DISTANCES OF ANTICATHODE TO SCREEN. IN CENTIMETERS

DISTANCES OF DISPLACEMENT OF SHADOW OF FOREIGN BODY

	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	
¼	1 2/41	1 8/41	1 7/41	1 6/41	1 5/41	1 4/41	1 3/41	1 2/41	1 1/41	1	40/41	39/41	38/41	37/41	36/41	35/41	34/41	33/41	32/41	31/41	1/41
¾	3 21/43	3 18/43	3 15/43	3 12/43	3 9/43	3 6/43	3 3/43	3	2 40/43	2 37/43	2 34/43	2 31/43	2 28/43	2 25/43	2 22/43	2 19/43	2 16/43	2 13/43	2 10/43	2 7/43	3/43
1 ¼	5 25/45	5 20/45	5 15/45	5 10/45	5 5/45	5	4 40/45	4 35/45	4 30/45	4 25/45	4 20/45	4 15/45	4 10/45	4 5/45	4	3 40/45	3 35/45	3 30/45	3 25/45	3 20/45	5/45
1 ¾	7 7/47	7 7/47	7 7/47	7	6 40/47	6 33/47	6 26/47	6 19/47	6 12/47	6 5/47	5 45/47	5 38/47	5 31/47	5 24/47	5 17/47	5 10/47	5 3/47	4 43/47	4 36/47	4 29/47	7/47
2 ¼	9 9/49	9	8 40/49	8 31/49	8 22/49	8 13/49	8 4/49	7 44/49	7 35/49	7 26/49	7 17/49	7 8/49	6 48/49	6 39/49	6 30/49	6 21/49	6 12/49	6 3/49	5 43/49	5 34/49	9/49
2 ¾	10 40/51	10 29/51	10 18/51	10 7/51	9 47/51	9 36/51	9 25/51	9 14/51	9 3/51	8 43/51	8 32/51	8 21/51	8 10/51	7 50/51	7 39/51	7 28/51	7 17/51	7 6/51	6 46/51	6 35/51	11/51
3 ¼	12 14/53	12 1/53	11 41/53	11 28/53	11 15/53	11 2/53	10 42/53	10 29/53	10 16/53	10 3/53	9 43/53	9 30/53	9 17/53	9 4/53	8 44/53	8 31/53	8 18/53	8 5/53	7 45/53	7 32/53	13/53
3 ¾	13 35/55	13 20/55	13 5/55	12 45/55	12 30/55	12 15/55	12	11 40/55	11 25/55	11 10/55	10 50/55	10 35/55	10 20/55	10 5/55	9 45/55	9 30/55	9 15/55	9	8 40/55	8 25/55	15/55
4 ¼	14 52/57	14 35/57	14 18/57	14 1/57	13 41/57	13 24/57	13 7/57	12 47/57	12 30/57	12 13/57	11 53/57	11 36/57	11 19/57	11 2/57	10 42/57	10 25/57	10 8/57	9 48/57	9 31/57	9 14/57	17/57
4 ¾	16 6/59	15 46/59	15 27/59	15 8/59	14 48/59	14 29/59	14 10/59	13 50/59	13 31/59	13 12/59	12 52/59	12 33/59	12 14/59	11 54/59	11 35/59	11 16/59	10 56/59	10 37/59	10 18/59	9 58/59	19/59

FRACTION TO BE ADDED OR SUBTRACTED FOR EACH CENTIMETER OF DISTANCE MORE OR LESS

CHART TO SHOW VARIOUS DEPTHS OF A FOREIGN BODY
FOR A TUBE DISPLACEMENT OF 10 CENTIMETERS

C. Johnston Holland

glass and screen. Attached to the wooden frame all round is protective X-ray rubber. Along one side of the screen commencing exactly opposite the centre of the hole is a 10-cm. scale. On this scale are two movable metal pointers extending half-way across the surface of the screen on the glass. (Diagram I, *see* p. 23.) In actual use this screen is laid upon the part under examination, the long part from the hole being in the opposite direction to that in which the tube is to be displaced. It will be seen that a small screen like this can be adapted to almost any

possible position in which it may be required, that the flexible rubber around will help to keep it in position as well as give the operator's hands, &c., protection from the X-rays.

Having found the shadow of the foreign body on the screen, the area of the illumination is diaphragmed down to a space about 1 in. square —this is done by means of a metal adjustable diaphragm on the top

DISTANCES OF ANTICATHODE TO SCREEN, IN CENTIMETERS.

DISTANCES OF DISPLACEMENT OF SHADOW OF FOREIGN BODY

	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	
½	$2\frac{8}{21}$	$2\frac{7}{21}$	$2\frac{6}{21}$	$2\frac{5}{21}$	$2\frac{4}{21}$	$2\frac{3}{21}$	$2\frac{2}{21}$	$2\frac{1}{21}$	2	$1\frac{20}{21}$	$1\frac{19}{21}$	$1\frac{18}{21}$	$1\frac{17}{21}$	$1\frac{16}{21}$	$1\frac{15}{21}$	$1\frac{14}{21}$	$1\frac{13}{21}$	$1\frac{12}{21}$	$1\frac{11}{21}$	$1\frac{10}{21}$	$\frac{1}{21}$
1	$4\frac{6}{11}$	$4\frac{5}{11}$	$4\frac{4}{11}$	$4\frac{3}{11}$	$4\frac{2}{11}$	$4\frac{1}{11}$	4	$3\frac{10}{11}$	$3\frac{9}{11}$	$3\frac{8}{11}$	$3\frac{7}{11}$	$3\frac{6}{11}$	$3\frac{5}{11}$	$3\frac{4}{11}$	$3\frac{3}{11}$	$3\frac{2}{11}$	$3\frac{1}{11}$	3	$2\frac{10}{11}$	$2\frac{9}{11}$	$\frac{1}{11}$
1½	$6\frac{12}{23}$	$6\frac{9}{23}$	$6\frac{6}{23}$	$6\frac{3}{23}$	6	$5\frac{20}{23}$	$5\frac{17}{23}$	$5\frac{14}{23}$	$5\frac{11}{23}$	$5\frac{8}{23}$	$5\frac{5}{23}$	$5\frac{2}{23}$	$4\frac{22}{23}$	$4\frac{19}{23}$	$4\frac{16}{23}$	$4\frac{13}{23}$	$4\frac{10}{23}$	$4\frac{7}{23}$	$4\frac{4}{23}$	$4\frac{1}{23}$	$\frac{3}{23}$
2	$8\frac{4}{12}$	$8\frac{2}{12}$	8	$7\frac{10}{12}$	$7\frac{8}{12}$	$7\frac{6}{12}$	$7\frac{4}{12}$	$7\frac{2}{12}$	7	$6\frac{10}{12}$	$6\frac{8}{12}$	$6\frac{6}{12}$	$6\frac{4}{12}$	$6\frac{2}{12}$	6	$5\frac{10}{12}$	$5\frac{8}{12}$	$5\frac{6}{12}$	$5\frac{4}{12}$	$5\frac{2}{12}$	$\frac{2}{12}$
2½	10	$9\frac{20}{25}$	$9\frac{15}{25}$	$9\frac{10}{25}$	$9\frac{5}{25}$	9	$8\frac{20}{25}$	$8\frac{15}{25}$	$8\frac{10}{25}$	$8\frac{5}{25}$	8	$7\frac{20}{25}$	$7\frac{15}{25}$	$7\frac{10}{25}$	$7\frac{5}{25}$	7	$6\frac{20}{25}$	$6\frac{15}{25}$	$6\frac{10}{25}$	$6\frac{5}{25}$	$\frac{5}{25}$
3	$11\frac{7}{13}$	$11\frac{4}{13}$	$11\frac{1}{13}$	$10\frac{11}{13}$	$10\frac{8}{13}$	$10\frac{5}{13}$	$10\frac{2}{13}$	$9\frac{12}{13}$	$9\frac{9}{13}$	$9\frac{6}{13}$	$9\frac{3}{13}$	9	$8\frac{10}{13}$	$8\frac{7}{13}$	$8\frac{4}{13}$	$8\frac{1}{13}$	$7\frac{11}{13}$	$7\frac{8}{13}$	$7\frac{5}{13}$	$7\frac{2}{13}$	$\frac{3}{13}$
3½	$12\frac{26}{27}$	$12\frac{23}{27}$	$12\frac{20}{27}$	$12\frac{5}{27}$	$11\frac{25}{27}$	$11\frac{16}{27}$	$11\frac{11}{27}$	$11\frac{4}{27}$	$10\frac{24}{27}$	$10\frac{17}{27}$	$10\frac{10}{27}$	$10\frac{3}{27}$	$9\frac{23}{27}$	$9\frac{16}{27}$	$9\frac{2}{27}$	$9\frac{2}{27}$	$8\frac{22}{27}$	$8\frac{15}{27}$	$8\frac{8}{27}$	$8\frac{1}{27}$	$\frac{7}{27}$
4	$14\frac{4}{14}$	14	$13\frac{10}{14}$	$13\frac{6}{14}$	$13\frac{2}{14}$	$12\frac{12}{14}$	$12\frac{8}{14}$	$12\frac{4}{14}$	12	$11\frac{10}{14}$	$11\frac{6}{14}$	$11\frac{2}{14}$	$10\frac{12}{14}$	$10\frac{8}{14}$	$10\frac{4}{14}$	10	$9\frac{10}{14}$	$9\frac{6}{14}$	$9\frac{2}{14}$	$8\frac{12}{14}$	$\frac{4}{14}$
4½	$15\frac{15}{29}$	$15\frac{6}{29}$	$14\frac{26}{29}$	$14\frac{17}{29}$	$14\frac{8}{29}$	$13\frac{28}{29}$	$13\frac{19}{29}$	$13\frac{10}{29}$	$13\frac{1}{29}$	$12\frac{21}{29}$	$12\frac{12}{29}$	$12\frac{3}{29}$	$11\frac{23}{29}$	$11\frac{14}{29}$	$11\frac{5}{29}$	$10\frac{25}{29}$	$10\frac{16}{29}$	$10\frac{7}{29}$	$9\frac{27}{29}$	$9\frac{18}{29}$	$\frac{9}{29}$
5	$16\frac{10}{15}$	$16\frac{5}{15}$	16	$15\frac{10}{15}$	$15\frac{5}{15}$	15	$14\frac{10}{15}$	$14\frac{5}{15}$	14	$13\frac{10}{15}$	$13\frac{5}{15}$	13	$12\frac{10}{15}$	$12\frac{5}{15}$	12	$11\frac{10}{15}$	$11\frac{5}{15}$	11	$10\frac{10}{15}$	$10\frac{5}{15}$	$\frac{5}{15}$

FRACTION TO BE ADDED OR SUBTRACTED FOR EACH CENTIMETER OF DISTANCE MORE OR LESS.

FRACTION TO BE ADDED OR SUBTRACTED FOR EACH CENTIMETER OF DISTANCE MORE OR LESS.

CHART TO SHOW VARIOUS DEPTHS OF A FOREIGN BODY.
FOR A TUBE DISPLACEMENT OF 10 CENTIMETERS

C. Thurston Holland

of the tube box—and the position of the movable tube box is so adjusted that the shadow of the foreign body is centred in this square. The next thing is gently to move the screen itself until the shadow of the foreign body—or some definite part of it—disappears in the hole in the screen. That done, a small stylographic pen is passed straight through the hole and the skin so marked. You then have a mark on the skin under which—in that position of the body or limb—the foreign body must lie. The next thing to do is to displace the tube box 10 cm. The

effect of this is to alter the position of the shadow on the screen. The second pointer on the screen—the first having been placed opposite the centre of the hole—is then moved to point to the second position of the shadow. The distance between the pointers read off on the scale attached to the screen gives the distance of the displacement of the shadow.

For practical purposes quarter centimetres are small enough for the localising of such things as bullets or pieces of shrapnel. The only other measurement required is the distance from the centre of the tube to the screen. Dr. Oram has invented a very simple method of getting at this at once. At Liverpool I use the Ironside Bruce couch; I do not believe there is a better couch for localising. Dr. Oram's idea is to take a centimetre tape measure of the spring variety and reverse the tape. This must be attached to the movable slide on the overhead bar of the couch; the distance of the anticathode to the top of the couch measured and the tape brought out till it reads at the top end this distance; then cut off so that the lower end touches the table. Fix a small weight on the lower end to just touch the table. When this is done by drawing out the tape to touch the surface of the screen, the distance of the anticathode to the screen is read off at the top end of the tape, whatever may be the position of the screen.

I have also devised a small arrangement which allows the 10-cm. displacement of the tube to be made easily and accurately. Attached to, or rather surrounding, one of the rails, under the couch on which the tube box runs, I have fitted a four-sided wooden box with no ends. This fits the rail accurately, but slides easily along it. On the top of this is a pointer, and this pointer is arranged parallel to the rail. When the tube box is in the first position—from which it must be moved 10 cm.—this carrier is pushed along until the end of the pointer touches the side of the box. The pointer is hinged so that it can be raised up out of the way, and this movement also fixes the slides to the rail. The pointer is also so long that when the tube box is moved up to the slider the movement is automatically 10 cm. Obviously a little arrangement of this kind allows of the movement of 10 cm. to be made from any position of the tube box and is very accurate. (Diagram II, *see* p. 23.)

There are many methods of determining the depths of the foreign body after the necessary measurements have been made on the screen. I have drawn up two tables of figures (*see* pp. 24 and 25) in which the top lines give the distances of tube to screen, and the figures on the left the distances of shadow displacement. The figure on the scale where these intersect is the distance in depth of the foreign body.

If one desires extra accuracy, one can control the observations by making a double exposure on the same plate, and then measure the displacement of the foreign body by the shadow on the plate. That, however, in the case of rifle bullets and large pieces of shell is scarcely ever necessary. During the last three months, since this method has been adopted, every foreign body has been found, and with the greatest ease; and no other method is now employed, except in special cases.

Dr. A. C. JORDAN: The method I am about to demonstrate is not intended to supplant any other, or to compete with others in accuracy;

Instrument for localisation of foreign bodies.

I simply show it as a convenient means of localisation which yields very accurate results. It is independent of the distance between the tube in the box and the fluorescent screen: it is likewise independent of photography. When Messrs. W. Watson and Sons made the instrument for me, I thought the idea was original with myself, but I discovered that my friend Mr. Shenton had described in the *Practitioner*, about seven years ago, a little instrument on the same principle which he had, even then, been using for eight years. My instrument consists (*see* figure) of a pair of uprights of square section, with clamp to hold the rim of the fluorescent screen, and base to rest on the couch. A horizontal needle has been made to slide along the upright, and this can be thrust in or withdrawn as required. The principle is to use the phenomenon of parallax

—usually the enemy of accurate localisation. If the needle be placed so that its shadow points to that of the foreign body, their shadows will only remain in a straight line in all positions of the tube if they are at the same level below the screen. If the shadow of the foreign body moves faster than that of the needle, we know that the foreign body lies deeper than the needle. The correct position of the needle can be found by trial in a few moments. The distance from the screen is then read off on the upright, which is engraved in eighths of an inch. In the case of small parts of the body—e.g., a limb—two needles can be used, on opposite sides of the limb. The needles must then be kept at the same level, and moved up or down together. To enable this to be done readily the instrument has been so constructed that each quarter inch is felt as the needle passes, and so one can work by touch. In some cases —e.g., the shoulder—only a single needle can be used. Any degree of accuracy may be attained by enlarging the luminous aperture, and increasing thereby the amplitude of the movements. Thus the chief advantages of the method are:—

(1) Accuracy, convenience and speed, the required distance being simply read off on the scale.

(2) Independence of the distance from tube to screen.

(3) Independence of photography.

The limitations of the method are readily stated: The foreign body must be sufficiently large and opaque to be visible on the fluorescent screen with a moderate current such as cannot harm the patient or the tube.

Dr. Hernaman-Johnson: It is curious that several people engaged in military work have all hit upon the same idea for the localisation of foreign bodies on the screen. The reason is that large batches of wounded are coming into the base hospitals, and it is impossible to use the Mackenzie Davidson method because of the time it takes. One of the advantages of the screen method is that one gets the tube directly below the bullet, and so one has a vertical line to work to. By the Mackenzie Davidson method one cannot get a vertical line right away. By the method now described, by manœuvring the tube and closing down the diaphragm until it is vertically below the bullet, the patient's skin can be marked below as well as above. That is very important, because it enables the surgeon to have a double guide. The mark below is obtained by means of a little instrument which I call a "ring localiser." It is an opaque ring on an aluminium handle, and across the ring are cross-wires. This is manœuvred on top of the patient until it encircles the shadow of the bullet, and that part is marked. Then it is slipped

beneath the patient on the couch, and a mark made underneath, usually by slightly tilting the patient. But as some patients are very ill it becomes desirable to have a means which obviates tilting the patient. That is accomplished in the instrument sold by Messrs. Watson by a pneumatic device. In the case of a limb, or the head, or neck, one can turn the patient on to his side and get "cross-markings." In that way one obtains a vertical line indicated by two marks, and a horizontal line indicated by two other marks. In the limbs in most cases this is all that is necessary. It is important to remember that when the surgeon begins to operate he often destroys the vertical relationships, but if, prior to the operation, lines 5 in. or 6 in. long are drawn at right angles to each other through the original dot, the position of the latter can be recovered at any time, as the "sagging" of the tissues does not extend to the extremities of the lines. The skin having also been marked vertically below the bullet, knowledge of the line on which the foreign body lies need never be lost. In the case of the pelvis, hip-joint, or abdomen, where a horizontal line cannot be obtained, a measurement of depth in inches must be given to the surgeon. I exhibit a wall diagram of a scale I use in the Cambridge Hospital at Aldershot. It has been designed independently of that which Dr. Barclay has just demonstrated. In use one has to add to the distance between anticathode and couch top the thickness of the part of the patient being examined. With regard to ascertaining the thickness of the patient, I make use of the compressor attached to the horizontal arm of an Ironside Bruce couch. This can be let down until it touches the patient's skin, and subsequently the distance from the compressor disk to the couch top is measured.

Sir JAMES MACKENZIE DAVIDSON, in reply to the President's invitation: I do not think I have much to say, as my work is fairly well known to members of the Section. But what interests me specially is to find that since the terrible war came on the scene, the subject of localisation, which fell somewhat into the background, has come forward again in a very prominent way. It has interested me much to see the various methods which have been shown for quick localisation, and a rapid method is, of course, essential where such a large number of wounded are arriving. The method I had the privilege of introducing many years ago was based upon co-ordinate geometry; it is supposed by many to be very difficult of application, but with some care and trouble it is not more difficult than learning refraction, or anything else which demands the attention of the student.

All the remarks about X-rays are centred upon methods of finding the bullet. But there are more factors in the case than that, because some of the injuries are very complex. For the latter I put in a plea for the antiquated stereoscope. Those who have seen the stereoscopic photographs must realise the enormous amount of information obtained from them, not only with regard to the bullet, but also as to the damage which it has done, which is sometimes more important than getting at the bullet itself. The various methods demonstrated are good; it is something like fashion. The man who invents a method of simple triangulation naturally thinks it is the best. I have a method myself for quickly arriving at the depth of the bullet. After once getting the central ray, the determination of the depth of the bullet is a simple matter. Captain Thurstan Holland's and Dr. Hampson's methods are excellent. But in many instances one requires to know more than the depth of the bullet, such, for instance, as its relation to other parts, and the best point from which to approach it. In the more difficult cases I cling to the old cross-thread means, which can be rendered very rapid. One requires a piece of gelatine, with cross-wires, and it is so manipulated that the shadow of the bullet comes over the cross-wires and then the tube is displaced and a tracing made. By putting that on the localiser, one gets the information straight away, without calculations. And if one wishes to see its relationship to the bones, that can be ascertained straight away too. There is an instrument which has not come into general use, because it is too complex; but if there should be a war in the far future—which I hope there will not be—it will be found there is available a stereoscopic screen in which with the patient standing up the position of the foreign body will be seen in absolute relief. Then the surgeon could know at once whether it was safe to approach it.

It is interesting to me to see so many enthusiastic workers evolving plans which give such good results; they do their part very well. I only wish surgeons would take a little more trouble in acting wisely on the information which the radiographer supplies to them. In a difficult case I advise the man who does the localising to be at the elbow of the good-natured surgeon who will listen to his instructions.

Mr. C. R. C. Lyster: Dr. Hernaman-Johnson's method is exceedingly interesting, more interesting to me than to others, because I described that method in 1903 in the *Archives of the Middlesex Hospital*,[1] and I have used it for many years.

[1] *Arch. of Middlesex Hosp.*, 1903, i, pp. 99, 100.

Major FRED. BAILEY: In practically all the various methods of localisation by means of the X-rays, the presence of a truly *vertical ray* passing through the *centre* of the diaphragm is essential. In examining half-a-dozen installations lately, in no single one was the vertical ray found to be accurately centred, nor had the makers so arranged the tube-holder that it was possible to centre accurately. The variability in size, &c., of the tubes used (even if the tube-holder can be moved in any possible direction) always means readjustment for every change of tube. I find that the simplest method of overcoming the difficulty is to have a movable diaphragm, which I place so that its centre coincides with the vertical ray; it is simply a piece of lead with a ½-in. diameter hole in it. It is most important in localisation to use an instrument of precision. To find the vertical ray I use the small instrument now exhibited. This is a lead cylinder, 4 in. high, with a hole $\frac{1}{16}$ in. in diameter drilled through it; the surface of the ends is ground exactly at right angles to the drilled hole; the cylinder is fixed on a base having three micrometer screws at the bottom, which provide for accurate adjustment. On the top is placed, at first, a small spirit level; the cylinder is adjusted by the screws until the spirit level shows that the top is absolutely horizontal, because the level of a frequently used X-ray table varies considerably. The drilled hole is now perfectly vertical, and the position of a vertical ray can be correctly found by the fluorescent screen, and the centre of the diaphragm made to coincide with it. I illustrate its use by a case in which a shrapnel bullet was lying in the psoas muscle anterior to the ilium and just outside the sacro-iliac synchondrosis. The question arose as to whether it would best be attacked from the front or behind; the surgeon recognised it would be a matter of some difficulty. The patient had originally been discharged with the bullet still in situ, but he returned, in a few weeks, saying that he wanted the bullet removed, as it gave him pain and he could not do his ordinary duty: so, eventually, the surgeon thought he would attempt its removal from behind. The depth was estimated to be 3½ in. from the skin. The patient was placed on the X-ray table and anæsthetised, the bullet was localised as vertically below a certain spot; this surface spot was marked with tincture of iodine as the man had been prepared for operation. The surgeon now passed a needle vertically down through the centre of the spot until it touched the ilium, hammered it into the bone, cut off the piece outside the skin and sent the man to the operating theatre. There he made his incision alongside the needle down to the bone, cut out the piece of bone with

the needle sticking into it, passed his finger into the muscle on the other side of the hole and removed the bullet. At the 2nd Eastern General Hospital at Brighton, since mobilisation, I have examined about 1,200 cases; I do practically all my work with the tube below the couch, using a Schall's tube-stand, which allows the X-rays to be directed upward from below or downward from above the patient. It also can be directed in any direction sideways and at any angle; this is of constant use in obtaining lateral views of limbs, &c., where the patient cannot be moved on to his side. By masking with lead I am able to take the antero-posterior and lateral views on the two halves of a 12 by 10-in. plate, and, if the exposure is accurate, the two views develop out together, and afterwards they always remain side by side for the surgeon to see at the same time.

Dr. Howard Humphris: I wish to comment on the remark of Sir James Mackenzie Davidson, that it would be a good thing if the radiographer could stand in the theatre at the side of the good-natured surgeon. That is a thing "most devoutly to be wished." There are several things to be desired; I will not indicate in which directions. I admit that in many cases the desirable thing is surgically impossible, though in four cases out of five it is possible. The radiographer, for instance, says a foreign body is 4 cm. below a given cross, and asks the surgeon to run a needle down to that cross. My experience is that if the surgeon does this, he will find the foreign body. But if the surgeon make, as the majority do, an incision immediately, he loses the value of the localisation marks, pushes his rubber-covered finger into the incision, and in so doing shifts the foreign body to a new site, and blames the radiographer for a mistaken localisation.

Dr. Metcalfe: I do not propose to describe any new method; I pin my faith to that described by Sir Mackenzie Davidson. I have not had the large number of localisation cases some members have had, but I think a method in which time is needed, and stereoscopic plates are used, is necessarily more accurate than any other method could be. In some cases, in too rapid localisation, a bullet is found through the size of the surgeon's incision, as he makes an ample cut through which it can usually be extracted, even if the position is not absolutely accurate. But such a rapid method would be out of the question for small pellets in the eye, for instance. I desire to mention something which I believe would apply to all these methods; it is in

regard to the measurement of the distance of the anticathode of the tube to the top of the screen over the couch. It is really so absurdly simple that I apologise for bringing it forward. I obtain a long steel rod, which I push down through the top of the couch, if it be a canvas-topped one; if it be a couch with a wooden top, one or two gimlet-holes must be made through which to pass it. This rod can be pushed through the opening in the diaphragm to the periphery of the tube. The rod is 60 cm. long, and there is a scale attached to it which can be moved up and down. I push it down to the level of the screen, say 15 cm., and deduct 15 from 60, giving 45, then, by adding the half-diameter of the tube, I have the distance at once. Callipers and other instruments for such measurements are often awkward; this instrument gives no break in continuity, and I regard it as useful.

Dr. N. S. Finzi: I wish to urge the necessity, in all cases, of a very thorough screen examination. I am aware that in some quarters there is a tendency to deprecate this, on account of a supposed danger to the operator; but I consider that in these cases of bullet and shrapnel wounds it is extremely necessary. I have had several instances in which the entry wound was very far from the site at which the bullet had lodged. One of the most remarkable is that of a man who had chest symptoms. The bullet entered behind the right scapula, and I was asked to examine the man's chest. There were present signs of effusion of blood in the chest, but no bullet was visible. Eventually, by thoroughly screening the patient all over, a shrapnel bullet was found in the left iliac region. There are other cases in which the bullet has been found far from the site of entry, and in which the symptoms have not indicated where it is. I had one case in which the bullet was either in the heart muscle or was attached to that organ, and in that case the bullet entered just in front of the head of the left humerus. If one simply takes a skiagram of the part, one cannot hope to localise a bullet which has travelled some distance from its point of entry. I am glad to see that most of the methods brought forward at this meeting necessitate a screen examination, because they are mostly screen-localisation methods.

With regard to the various methods of localisation, I think it would be a mistake for radiographers to confine themselves to any one method. For instance, in the case of a limb, I consider the easiest method, at all events in the lower part, is that of crossed planes as described by Dr. Hernaman-Johnson and by Mr. Lyster. The parallax method is

also good for a limb, though I doubt if it has the accuracy of the others, and a permanent record cannot be made. When there are fragments in the muscles of the back, the triangulation method must of necessity be used; they cannot be seen sufficiently by the application of the parallax method, nor by the Hernaman-Johnson method. The use of the Mackenzie Davidson method for localising fragments has the great advantage that it enables one to localise the bullet in relation to other parts, such as bony points. By Dr. Hampson's method one can localise the depth of the bullet, but cannot establish the lateral relations of the fragments to other points. Recently a patient was brought to me with a small fragment of shrapnel in the muscles at the side of the third and fourth lumbar vertebræ, and I was able to localise this in relation to the transverse processes. In the previous attempt, in which I localised merely the depth, the surgeon did not place the patient in exactly the same position as he occupied when the fragment was localised, and consequently the fragment was not found, but when its relation to the transverse processes was determined it was easily recovered. Dr. Metcalfe has described a method of finding the distance of the anti-cathode from the top of the table. If the tube happens to be hot, however, and the cold wire were to be put on to the surface of it, the result might be disastrous. I suggest a very accurate method of localising a focal point—namely, by the Mackenzie Davidson localiser. If one puts a needle on the couch, and puts the screen a definite distance above this, for instance 10 cm., and the screen is then displaced a known distance, the depth of the foreign body will be known; it is only necessary to adjust on the bar of the localiser, so that the threads cross at that depth, and then the distance of the focal point can be read off. That method of using the localiser is not generally employed—namely, the localisation of the focal point of the tube.

The PRESIDENT (Dr. W. Ironside Bruce): The subject is so important that I consider it desirable that it should be adjourned to the next meeting of the Section, on February 19.

(Adjourned to February 19.)

Electro-Therapeutical Section.

February 19, 1915.

Dr. W. Ironside Bruce, President of the Section, in the Chair.

Discussion on the Electrical Treatment of Wounds, Sinuses, Frost-bite, and Sprains, considered more particularly in relation to the present War.

Dr. Knowsley Sibley said: It is recognised that when wounds do not heal it is because of the presence of pathogenic organisms of various kinds, and that under the most favourable circumstances antiseptics can only deal with these when they can be brought into actual contact, and made to penetrate into the deeper recesses of the wound. This can be done most efficiently by the process of ionisation. By this means not only those organisms living in the pus covering the granulations will be attacked but also those thriving beneath the pus, and in the necrotic tissues themselves, will be destroyed.

The difficulty which arises in the surgical treatment of wounds, especially deep wounds, is to be able to apply the antiseptic to the bottom of the wound, and so destroy the mischievous organisms. After a time many of these organisms will not only be living in the free pus discharging from the wound, but also be thriving in the necrotic tissues deep down in the wound. It is only possible for antiseptics as applied in ordinary surgical dressings to get at a small proportion of the pathogenic organisms. It has long been recognised that the process of ionisation is excellent for the healing up of chronic sinuses, and it should be equally efficacious if applied to recent ones. The treatment is, moreover, painless. The limb, such as a hand, forearm or arm, foot, leg, or even the lower end of the thigh, is placed in a bath, filled with warm water containing the drug to be applied dissolved in it. The

active electrode is placed in this, and the opposite hand is immersed in a basin or beaker containing slightly saline water, into which the inert electrode is placed. The constant current is gradually turned on until some 10, 20, or more milliamperes are delivered, according to the requirements of the case, and the process is continued for from twenty or thirty minutes to much longer periods, the treatments being repeated as frequently as the individual indications may dictate.

It follows that in dealing with a gaping wound the water with a drug or antiseptic dissolved in it will penetrate into all parts which are accessible to the exterior. In the case of a penetrating wound communicating with the surface only by a narrow sinus, it will be necessary to insert the metal electrode covered with lint, saturated with the solution, into the bottom of this. Thus, wounds of the limbs can be conveniently and comfortably dealt with; those about the head and neck are more difficult to adapt, but it should often be possible to arrange even for these. It is also quite simple to treat by ionisation practically the whole body (with the exception of the face) at the same time. For this I have arranged a full bath, into which the patient gets, the hands and forearms being placed in a wooden trough, suspended over the top end of the bath, or one or both arms are placed in separate rubber bags filled with water. The drug to be administered is dissolved in the water in the bath, in which is placed the active electrode, while the inactive electrode is put into the trough or bags in which the arms are placed, and by this means a circulating current is set up.

Of the various drugs which may be used, it will probably be found that the most generally useful are sulphate or chloride of zinc, a 1 or 2 per cent. solution of which has very cleansing and healing properties, and is especially beneficial for the healing up of chronic wounds or sinuses.

The same principle of treatment should be efficacious not only for the purpose of the rapid healing up of chronic, comparatively healthy wounds, but also in those in which active suppuration, or even gangrene, has appeared. The best and most efficacious treatment for the scars left after the healing of wounds is by ionisation with sodium chloride and other solutions, according to individual circumstances. This procedure, especially if combined with hyperæmia induced by suction cups, often does much to improve the cosmetic appearance of cicatrices.

The constant current of electricity has long been recognised as an excellent treatment for frost-bite. Ionisation with various preparations

will restore vitality in the slighter cases, and assist in the removal of the sloughs in the severe ones, producing a more rapid healing of the ulcerative surfaces in those where the necrotic processes have extended to some depth.

Dr. TURRELL said: We have listened at our recent meetings with much interest, not unmixed with bewilderment, to the numerous and ingenious methods which have recently been devised by our allies, the radiologists, for the accurate localisation of foreign bodies. It is now our duty as electro-therapists to show what we can contribute towards the relief of the suffering entailed by this terrible war, to show how by electrical methods we can render those incapacitated by stiff joints or other lesions fit to take part in the defence of their country. It is the duty of those of us who have the privilege to be attached to a military hospital to consider by what electrical means they can most speedily and effectively ensure the return to the front of those sick or wounded who come within the scope of electrical remedies.

Let us first discuss those cases which, except for the aid of electro-therapy, would be rejected as unfit for military service. There must be a large number of old injuries, sprains, strains, nerve injuries, swollen joints, &c., which fall within this category, as an example let me give the following case:—

G. C., an Oxford undergraduate, consulted me on January 7, 1914, for chronic effusion into both his knee-joints. He gave a history of two years' duration, and stated that he had been treated by all conceivable methods except electricity. During the preceding long vacation he had spent some time in a London hospital under a well-known surgeon, who had incised one of his knee-joints and found the synovial fluid perfectly sterile. There was no history of syphilis, rheumatism, or other disease likely to exercise a causal influence. Drugs and rest seemed to have little or no influence on the condition. He had had to give up all forms of sport and exercise, and the whole of the preceding term he had been unable to walk and had been wheeled out in a bath-chair. On his first visit he hobbled into my room with the aid of sticks with splints applied to both his knees. On examination his knee-joints were both found to be distended with fluid, but not tensely distended—a general flaccidity and wasting of the muscles was one of the most noticeable features. The fluid was not confined to the joint cavities but extended a considerable distance up the thighs, evidently communicating with the subcruræus bursæ. This extension was very

evident when the patient was subsequently treated by the Morton wave current, as the fluid could then be seen pulsating half-way up the thigh with the muscular contractions excited by the current. With such a wide area of distribution the fluid, though present in large quantity, only caused a measurement over the patella of 14 in. It occurred to me that the treatment should be selected not only with a view to causing the absorption of the fluid, but also with the view to preventing its reaccumulation by increasing the tone or intrasynovial pressure by developing the extensor muscles of the thigh. With this object in view the splints were at once discarded and the patient was treated daily by the Morton wave current, and at the outset electrically provoked exercises were applied to the muscles of the thighs. Subsequently, to hasten the dispersal of the fluid, the Morton wave current was preceded, and I think considerably assisted, by the preliminary application either of ionisation with iodine or of diathermy. In four days a decided improvement had taken place, the fluid was reduced in amount, and the patient could get about better. After a week's treatment he was able to cycle for 6 miles. The fluid had nearly gone from the right knee, but there was still a large amount in the left. On February 2 no fluid could be detected in either joint after the end of the treatment. On February 4, less than three weeks after the treatment had been commenced, the patient had no fluid in either joint, could run up and down stairs, and could bicycle up hill. The treatment was then discontinued. On May 14 patient called on me in order to get a certificate explaining the circumstances, to enable him to rejoin a golf club which he had resigned in the autumn under the impression that he would never be able to play again. There was then no fluid in either joint and the muscles were well developed. He had been playing cricket in the rain on the preceding day. He told me that, during the Easter vacation, he had had an attack of measles followed by some rheumatism, and at that time there was again a little fluid in his knee-joints which soon cleared up, and had not since returned. At the outbreak of war he applied for a commission and was passed as medically fit. A few days ago I heard that he was in training at Aldershot—marching, digging trenches, &c.—and had had no further trouble with his joints.

Among the various conditions which we are called upon to treat at the base hospitals at the present time, none is exciting more attention than the treatment of frost-bite. When the therapeutics of this affection were first discussed at Oxford, I was chaffingly asked

by one of my colleagues if I would not like to treat it, as well as everything else, by electricity. I at once replied that I should certainly treat my cases electrically, as it appeared to be the most rational method of dealing with the symptoms and pathological conditions which occur. First of all there is the pain. Now, which is the more rational method—to relieve by reducing the stasis by the penetrating warmth and vaso-dilator effects of diathermy, and to relieve the stasis and swelling by the static breeze? Or to keep the pain in subjection, without removing the cause, by repeated doses of morphia, or to attempt to relieve the pain by lead and opium applications, decreasing instead of increasing active hyperæmia and reparative processes, or again, by the application of hot fomentations, running the risk of converting a dry into a moist and spreading gangrene?

It is, I am sure, unnecessary to-night to labour such points. The question for discussion will rather be, by which electrical modality we can most speedily and most effectively give relief. When the pain is really acute, I first try diathermy, and it hardly ever fails to give, at any rate, temporary benefit. When the pain is not of a severe character one application is frequently sufficient; the patient next day will probably say that he has lost all his pain, that he can move his toes better, and that his feet are less tender on walking. Possibly a desire for sick furlough hastens the recovery of the power of walking in this class of case.

Where the pain is severe, I usually find that immediate relief occurs after the first treatment, and lasts for four or five hours, the pain coming on again at night and disturbing the patient's sleep. After the second day's treatment a good night's rest is usually secured, and with a continuance of the treatment all pain ceases in a few days. Occasionally one meets a case where little or no relief follows the application of diathermy; but such cases when treated by the static breeze usually experience marked benefit. I have endeavoured to ascertain whether these cases present any symptoms or signs differentiating them from the diathermy class. So far as my experience goes, the cases specially suitable for the static breeze are those in which the pain comes on some time after the frost-bite, and those presenting signs of inflammation and swelling. The static breeze is specially indicated when the patient is in an exhausted condition and the constitutional effect of the static bath is desired.

In applying diathermy 10 by 5 c.m. electrodes are placed one on the dorsal and one on the plantar surface of the foot on the proximal side

of the base of the toes. Under the electrodes is placed a pad, formed of three layers of Turkish towelling, soaked in saline solution, the whole being secured in position by a Martin's rubber bandage. A current of about 0·9 ampere is passed for nine minutes or until the patient complains that the heat is unpleasant. The pads must not be placed over the toes themselves or unequal application and blistering of the toe-joints will result. This use of pads is the German method of applying the current. The French apply the electrodes direct to the skin and ask what is the use of obtaining a mustard-plaster effect when administering diathermy. The Americans advocate the use of kaolin pads. Where the application is made over bony prominences the use of pads is essential in order to get the requisite even application. I never allow my nurses to give diathermy without pads, but I often when personally administering the current remove the pads after a minute's application and apply the bare electrodes direct to the skin when treating soft areas. In this way one can get a larger amount of current out of the apparatus. With the pads well soaked with cool salt and water no mustard-plaster effect is produced, the current is better borne, and I have never seen the steam effects of which the Americans complain. By the addition of the salt the electrical resistance of the pads is so diminished that they do not heat to any harmful extent. Sometimes, however, one wishes to obtain a superficial and not a deep effect. This may be accomplished by using pads soaked in water with no salt; the electrical resistance of the pads is thus increased and increase in the superficial heating is obtained. But whatever pads you use do not use modelling clay, as I was once recommended to do. This question of the use of pads is of the greatest importance in the application of diathermy. Where the skin is broken in frost-bite or where there are large blebs the static breeze appears to me to be the best treatment. Cases of frost-bite with small blebs or with loss of sensation in the feet I have found do best with the high-frequency vacuum tube. Sometimes one application will restore sensation, and its effect appears to be more stimulating than the static breeze. Small blebs dry up very quickly with this treatment. Where the skin is broken or where the blebs are large the static breeze with the patient negatively charged is the treatment of choice. Stasis is thus relieved, the blue violet rays and the ozone contribute to the maintenance of asepsis, induration and swelling diminish, an active hyperæmia ensues, and assists in the early separation of the necrosed tissue.

At the 3rd Southern General Hospital, Oxford, forty-eight cases of

frost-bite have already been electrically treated with most satisfactory results. I do not wish to occupy your time by reading notes of uniformly successful treatments, but I should like to give you particulars in some detail of an extremely interesting case of frost-bite, the treatment of which certainly cannot be regarded as having been uniformly successful. The chief interest of this case is perhaps dermatological rather than electro-therapeutical, but in view of its extreme rarity and the fact that all electro-therapists should be dermatologists, and that all dermatologists will soon have to become electro-therapists, I trust you will pardon me for occupying your time with the following notes. I referred as follows to the early history of this case in some notes which recently appeared in the *Lancet* (January 30, 1915, p. 229) :—

"The worst case of frost-bite which has been admitted to the hospital has been under treatment for about six weeks by this method (static breeze). On admission the toes were hard, dry, and withered, the sole of the foot was covered by a large black bleb, and on the dorsum of the foot a line of demarcation was already appearing about 1 in. from the base of the toes. The static breeze has been applied daily, and pain, whenever it has occurred, has been relieved by the treatment. The toes are now separating at the metatarso-phalangeal articulation. The granulations are very healthy in appearance, the wound has kept perfectly aseptic, and only on one occasion has the temperature risen to 99° F. The patient's general health has much improved. Hardly had these notes been written before a gradual change began to occur in the patient's general condition: he went off his food, became listless, and developed several spots which were regarded as being due to acne; these were considered to be caused by lack of fresh air and exercise. Motor drives were accordingly arranged for. On February 5 the following note was made: 'With the aid of a pair of scissors the dead toes were painlessly separated this morning. The patient is covered with an irritating rash. The application of boracic powder is to be discontinued.' Boracic powder had been very freely applied to the granulations in order to keep them as dry as possible between the treatments. Realising the amount of powder which had been applied to the very active granulations, I formed the opinion that the eruption was due to the absorption of boron, and that the case was one of boracic acid poisoning. The rash commencing as a few scattered papules soon developed into a seborrhoide type distributed all over the body, with a psoriasis-like appearance on the elbows. The scalp became very

scurfy. Itching and irritation were only troublesome at the onset. On the second or third day minute papules appeared on the interdigital clefts of the fingers, and the Sister of the ward, mistaking them for scabies burrows, applied sulphur ointment. On the following day the fingers were studded with sago-like nodules, especially thick at the bases of the nails; these nodules subsequently became confluent, forming blebs, clear at first and then pustular. The face and eyelids became swollen and stiff, difficulty was experienced in opening the mouth. The sight became dim. The pulse was very weak and frequent—132, with temperature 100° F. The tongue was swollen, inflamed, and fissured. The patient's condition was very serious, and only liquid nourishment could be taken. The skin is now drying up and is coming off in flakes and scales. The pulse-rate is subsiding and the general health is steadily improving. The treatment has consisted in the administration of alkalies with a view to the elimination of the boron as the soluble sodium borate. Stimulants have been given to maintain the strength.

"On February 9 Sir William Osler dictated the following note: 'Rash on hands is very remarkable, begins as small pin-point papules, some with little, some with no areolæ, quite small ones are whitish and translucent, they occur singly or in groups, more on the palms than on the backs, the whole palmar surfaces are studded with raised firm bodies looking like the rash in dysidrosis. On the trunk it is a papular erythematous rash capped with dry brownish scales.'

"Dr. Gunn, the University Reader in Pharmacology, who kindly examined the urine for boron, wrote the following note: 'Patient shows the following symptoms characteristic of the condition diagnosed, in addition to skin lesions and acceleration of pulse: Muscular weakness and marked depression. He says that he felt tired and miserable since the rash came out; sleeplessness, headache (occasional), dryness of throat, and difficulty of swallowing. He says that he feels as if his throat were closing up. Blurring of vision, injection of conjunctivæ, œdema of eyelids, facial œdema sometimes the only symptom of mild poisoning; dryness of the lips. Urine: No albumin, no blood; 15 c.c. evaporated, and examined, gave definite but slight traces of boron (by flame test and $HgCl_2$).'"

From the ophthalmic report of Captain Adams it would appear that the dimness of vision was due to a filmy secretion over the cornea. The disks and fundi, as far as could be seen, were normal.

The area of absorbing surface in this case was about 125 sq. cm. During the static treatment the patient was negatively charged; the

toxæmia cannot therefore in any way have been due to ionisation, but probably the activity and absorbing power of the granulations were increased by the frequent application of the static breeze.

Sprains of joints and muscles arising from falling down "Jack Johnson" holes and other causes yield as a rule very readily to the Morton wave current of the static machine. In the case of stiff joints, galvanism followed by the Morton wave current seems to give the best results. By the use of these modalities the patient's return to the fighting line can undoubtedly be much hastened.

Some of the most interesting cases from the electro-therapeutic point of view are the immediate and remote effects resulting from nerve injury, and it has wisely been decided to devote a special evening to their discussion.

Before concluding I should like to draw attention to the electrical treatment of the pain and disability resulting from peritoneal adhesions. It is not to be expected that electrical methods will have any appreciable influence on firmly organised adhesions. These, however, are not the cases which give rise to much pain; it is in those cases in which the peritoneal surfaces are glued less firmly together by the exuded lymph, and where movement and friction takes place between the roughened surfaces, that most pain is experienced. In private practice I have had two cases where very marked relief has followed the application of diathermy in this condition. In one a laparotomy had revealed the presence of numerous adhesions from an old appendicitis; there was great pain on movement. The patient was sufficiently relieved after a course of diathermy to enable him to return to his work. I have since lost sight of this case. The other was the case of a lady who for eight years had suffered such pain on any movement that she had become almost a chronic invalid. She was unable to cycle, walk, or stoop without producing acute pain. After a rather prolonged course of diathermy she was completely relieved, and has been able to walk, to cycle, and to do gardening without any pain for the six months which have elapsed since the treatment was discontinued.

I find that Nagelschmidt in his book on diathermy refers as follows to the treatment of such cases: "The favourable effect of diathermy upon adhesions calls for special notice. Just as marked relief from pain is produced after a few treatments in cases of pleural adhesions, scars on skin, traumatic and post-inflammatory inflammation of joints, so in cases with intraperitoneal bands a similar effect is observed. In fact,

sometimes after one treatment a complete cessation of all discomfort occurs. Observation of the effect of diathermy on scars in exposed position—e.g., scars on skin (lupus, burns, &c.), post-operative scars on periosteum and tendons, which become softer and more supple—throws light upon the ætiological rationale of this treatment. The softening effects of diathermy and the production of mechanical mobilisation may also be studied clearly in abnormal positions of the uterus due to traction by scars or cicatrisation. In refractory cases a method of treatment to be recommended is the combination of massage with diathermy, even when massage alone has been used before for months without effect."

The following is a typical example of the effect of diathermy on this class of case: November 29, 1914: Private J. L., was admitted to the 3rd Southern General Hospital, under the care of Captain Duigan, complaining of pain in the region of a scar in the right iliac region, the seat of a former operation for appendicitis.

History: In 1911 the appendix was removed at the Alexandra Hospital, Cosham, and three months later the wound was re-opened, and drained for an abscess, a tube also being placed in the left flank. Two months later he was operated on for right inguinal hernia. Three years later in the West Indies he underwent a fourth operation, the appendix region being opened for painful adhesions. He was free from pain after this.

Present illness: Three weeks ago, whilst lifting a sandbag in the trenches, he felt sudden pain in the lower abdomen, just internal to appendix operation scar. This prevented him from walking. He was reported sick and was invalided to the base hospital at Boulogne for ten days. Since arrival in England he has been easier, and lying quiet in bed he has no pain. Patient had pain in walking and could not hold himself upright. On December 16 the patient was sent to the Radcliffe Infirmary for electrical treatment. The following day Captain Duigan made the following note: "December 17: Is having electrical treatment daily; immediate result is more pain, and then a good deal easier. December 24: Improving under electrical treatment; walks better, less pain." Patient continued to improve, and after twenty applications of diathermy he could walk perfectly erect without pain. He was then discharged to a convalescent home. The Sister of the ward tells me that she saw him on his return, and that he was free from pain and walking quite erect.

Dr. CHARLES RUSS: It gives me pleasure to make a contribution to the study of the treatment of suppuration by active current. I believe that with a fuller recognition of the factors at work in suppuration, the electric current will be found a very potent remedy. I first approached the subject at the bacteriological laboratory during 1907-08-09, and I believe there has lately been a realisation of the significance of bacteria in suppuration. On the one hand, there are the bacteria associated with their toxins—of the poisonous nature of the latter members do not need to be reminded. Volume for volume, the strongest ordinary chemical antiseptics are poor in comparison. On the other hand, there is the patient's resistance, and that consists in changes in both volume and composition of the blood supply, and in particular in the emigration of polynuclear cells. It is only when the latter have migrated to the site of a suppurating lesion that they are known as pus cells. During the last three or four years I have been studying particularly the effects of electrical currents applied in a special way, and I hope to give reason for my belief that there are factors in electrolysis directly antagonistic to the noxious factors in suppuration and other factors which assist the patient's resistance. The types of suppuration about which I wish to speak—and they are the types I have treated—are cases of ordinary chronic ulcer, such as varicose ulcer, acute septic wounds (usually due to trauma), and infected mucous membranes; in all these cases the factors I have mentioned operate. In 1909 I had the privilege of reading before the Royal Society a paper on some purely laboratory experiments and observations I made on the movements of bacteria in fluids—i.e., during electrolysis. The type of organisms I studied were the disease-producing ones: *Staphylococcus pyogenes aureus*—the commonest cause of sepsis — colon bacilli, typhoid bacilli, and other leading groups. If a twenty-four hours' pure culture of *Staphylococcus aureus* on agar be put into a tube with 2 per cent. sodium chloride and emulsified, the organisms being alive, and the current be then passed through by means of submerged electrodes, it will be found that after a certain period the staphylococcus has passed over until those microbes are completely aggregated at one of the electrodes: in the case under consideration it will be the anode. All the experimental work, which I did on the bench before approaching a patient pointed to this emigration of bacteria, no matter whether the bacilli I worked with were dead or alive. It is probably due to the affinity between the moving ion and the bacterial envelope. Nearly all organisms in sodium chloride will go to the positive electrode. It is important to note, that

if one withdraws a portion of the accretion after twenty minutes, a large number of the bacteria will be found to be dead, and this shows that the procedure is lethal to bacteria.

Two important facts emerge in the course of treating cases. The lethal effect can be directed against the bacteria in the focus of suppuration. The first case I treated was one of varicose ulcer, chosen because the lesion was easily visible: its varying size could be accurately measured, and the technique could be well adapted to the leg. By the time the ulcer was chronic I found the bacteria were usually mixed; some of the ulcers were 4 in. square. My object was to draw the bacteria out of the granulations. I fitted a glass vessel over the ulcer, and made it water-tight with plasticine. I then filled it with sodium chloride and submerged an electrode; in that way I did the same in the human subject as I had been doing in the case of the test-tube. Organisms left the granulations as the current flowed from the indifferent electrode. Thus, over the lesion I brought a suitable column of fluid to bear, and through that I arranged a circuit in such a direction that the bacteria would leave the lesion. I need not remind members of the perfect cellular contact which a conducting fluid makes with all the irregularities of a lesion. Sodium chloride is not looked upon as a powerful antiseptic, therefore the effect produced is not that of fluid antisepsis. I would like to mention an interesting control experiment which forcibly reminds me of the lethal effect. I wanted to prove whether the organisms were actually drawn out of the granulations, because, of course, no one could see them make their exit. In the U-tube experiment there could be no doubt about the mass movement of the organisms; but on the limb one cannot see it. I therefore, before treatment, put on clear saline and stirred it up so as to get an emulsion, and put $\frac{1}{4}$ c.c. of it on to an agar plate, and I intended to count the colonies. After the treatment I shook it up again to see if I had twice or thrice the number, the inference being that multiplication would be due to their having been drawn out. I obtained a quantity of colonies on the first plate—a thousand or so—while in the second I got nothing, this showing that they were all dead. All the ulcers which I treated in that way were healed.

My friend Mr. Lyster has treated a series of septic fingers, which are known as "casualty hands," the most severe half-dozen which the house surgeon could pick out for him. Pus was welling out from those terrible digits. The 2 per cent. sodium chloride was arranged over these lesions, and not one of them came to amputation, a result which often

happens in these cases. Mr. Lyster, at that stage, was bolder even than I was, and he showed great adaptability in applying a column to the suppurating surface of the eye, corneal ulcers and conjunctivitis; nothing but the 2 per cent. fluid was used. The ulcers treated were pale, indolent, and of the wash-leather type, thoroughly anæmic, but at the end of fifteen minutes from the current being passed the vessels were turgid and much congested, even to the point of oozing blood. That, of course, was in favour of the patient, for an effect equal to that of the Bier's bandage had been produced, the benefit of which was due to the enhanced blood supply, the improved plasma flow, and the increased phagocytosis. But the method I am describing could be used for parts of the body in which a bandage could not be applied.

I have seen the good effect demonstrated in a distressing condition which I have studied more than anything else—namely, cystitis. When I read my first paper, a surgeon in the room said, "Why don't you draw bacteria out of a man's bladder who has got cystitis, for there is a suppurating mucous membrane which is accessible to a column of fluid?" A column of fluid can be put in, an electrode can be let down inside a rubber catheter, and a belt carrying a metal core encircles the lower hip, and in that way one is enabled to apply the treatment to the whole suppurating and inflamed surface. I have taken old-standing cystitis cases, of years' duration, whose case-books show a monthly attendance at hospital, or perhaps fortnightly, and in which, in fact, all kinds of treatment have previously been applied. In all the behaviour has been the same—namely, a decline in pus formation and a great improvement in such symptoms as frequency of micturition and those which are due to the chronic absorption of coli toxin. After an extensive experience in urine analysis, I know that organisms in urine from cases of cystitis are seldom seen inside the pus cells. But after treating cases electrically in this way I have obtained some remarkable films showing polynuclear leucocytes literally stuffed with bacteria.

Another point is that in chronic suppuration I have seen colon bacilli undergoing morphological change. After treating certain cystitis cases, keeping at the same time an eye on the urine, I have found the bacilli becoming stringy, definitely longer, and changed in respect of their reaction to the standard Gram staining, which shows an alteration in the chemistry of the protoplasm. When the bacilli attain this increased length they no longer possess anything like the same virulence, and there is then no pus formation, or at all events very little. Pus disappears from the urine after this treatment, and

though I have watched cases for twelve months afterwards, it has not reappeared, and the organisms remaining are still elongated. I was curious to find out whether, by passing a weak current through a tube of bacilli, the bacilli could be elongated, and that did happen, though they were not so long as in the cases treated. I have also done a considerable amount of work in the study of gonorrhœa in the male, on the same principle.

I should like, in conclusion, to project on to the screen a couple of charts from very chronic cases of cystitis. Although they show only the frequency, there is a simultaneous improvement in the pus formation and toxic absorption, which shows that the method really overcomes the causal agent of the suppuration. The first case was at St. Peter's Hospital. Mr. Pardoe handed the patient over to me, in, I believe, an amused state of mind, for the man had been attending seven years, and had been getting out of bed to pass water five or six times nightly. The man was aged 56, a civil servant, dull, and therefore thoroughly reliable. I cross-examined the patient to get the clear facts. There were staphylococci, the ropy masses, and the scalding and difficulty in micturition, as well as sleeplessness. The method described was applied to him, and the frequency came down, as the chart showed. One night it rose to five times again; but as it was Sunday I focused the current on the prostatic urethra with good results; the perforations of the catheter were found stuffed with pus, evidently from the prostatic ducts. The frequency came down, and the next night he got up only once. The treatment was concluded on April 3, 1914, and since then the patient has had no further treatment, and enjoys unbroken sleep. His urine is not yet free from staphylococci, but it is free from pus. This patient's case has proved a very satisfactory one.

The other case to which I wish to refer was an acute one, of six weeks' duration. I gave a course, and then left the patient alone. He seemed to be on the point of a relapse. When the frequency amounted to five times a night I decided to interfere, and I made one administration for an hour, once a week for three weeks, and since then he has had clear nights.

Time does not permit dealing with more clinical material, but I hope the remarks I have made will be of service, because if suitable electrical treatment be in future applied to suppuration I think the method will be profoundly respected by surgeons.

Dr. HOWARD HUMPHRIS: I can confirm, in almost every particular, the results that Dr. Turrell has attained. I have read in several papers statements to the effect that the cases now seen were not frost-bite, but chilled feet. One high authority said there were no cases of frost-bite, but with this I do not agree, though it may be that he had seen none. The cases of frost-bite fall into two categories—the anæsthetic and the painful. I agree that the painful cases, as a rule, are not those with broken skin, and these answer to treatment by diathermy. The cases which had proceeded to gangrene I treated by the static breeze. I have seen some 200 affected toes, and most of them have looked as if they were going to be gangrenous; but, so far, I have lost only one toe among these. Some surgeons are sceptical about the electrical treatment, but one who has made inquiries as to results found that some cases, of equal virulence to his own, were treated electrically and had gone home well, while those not so treated, admitted at about the same date, were not well. That surgeon accordingly came round to the support of the method, and wrote to the medical papers saying that for non-gangrenous frost-bite electricity was of great value. At present I am treating a case with both feet frost-bitten. The patient is suffering intense pain, and the skin is in blebs, with an offensive sanious discharge. The surgeon in charge feared it would result in the anterior part of the feet having to be amputated. That was a week ago, and now a toe or two may be lost from each foot, but the loss will not be greater than that. Almost immediately there was a disappearance of the offensive odour, and the pain was subdued by small doses of aspirin, instead of the two "tabloids" of morphia previously necessary. For the anæsthetic form the faradic brush, and for the hyperæsthetic galvanism and diathermy are being used. With regard to sprains and nerve lesions, I can confirm what others have said. Diathermy for pain in nerve lesions has yielded remarkable results, and for recent sprains, such as those due to recruits falling from their horses, great relief is afforded by the Morton wave current.

Mr. BOKENHAM: My experience confirms that of Dr. Humphris in regard to the electrical treatment of frost-bite and sprains. For the interference with local metabolism, such as trench frost-bite entails, there is nothing to equal the effects of the static breeze discharge, but there must be a sufficient amount of discharge to cause benefit. I would say the same for some cases of indolent ulcer, and obstinate sinuses, such as I had to treat in Boer War cases, and at that date I was

convinced that static electrical treatment was much to be desired. In the treatment of deep sinuses, I have formed a good opinion of the value of ionisation, using sufficiently small currents, by means either of succinimide of mercury solution or by zinc electrodes amalgamated with mercury.

Dr. G. B. Batten: I desire to express my gratitude to Dr. Russ for his suggestive paper. May it not be that when Dr. Sibley used zinc sulphate and zinc chloride, he placed the limb practically in a positive bath, and immersed the rest of the body in a negative pole? Thus, while aiming at driving zinc ions into the tissues, he was also aggregating the deleterious microbes around this positive pole. Reasoning from that, is it possible to get as good results with the substitution of a 2 per cent. salt solution for the fluid he used, in the way suggested by Dr. Russ?

Mr. C. R. C. Lyster: The Section is deeply indebted to Dr. Russ for making a great advance in knowledge concerning electrolysis. I have had the opportunity of treating a dozen or more cases on the lines Dr. Russ has laid down, and I can speak with definite knowledge that quite as good, if not better, results can be achieved with simple salt solution, so long as one employs a solution, not a pad. A solution admittedly cannot be applied to all parts, but I have succeeded with legs, and fingers, and eyes, and I have exhibited the identical cups I used for those cases. Twenty years ago, electrolysis was used with pads for driving in zinc and mercury and copper, but the bacteriology of the matter was never entered into until Dr. Russ did the work he had spoken of for the Royal Society. All present will feel deeply indebted to him for having come to the meeting to explain the process.

Dr. Reginald Morton: I wish to associate myself with the words of appreciation on the work which Dr. Russ has done. It is one of the most important communications which has been made to the Section for a long time. I would mention a practical point, because last autumn I had a case of ischio-rectal sinus, rather deep, which would not heal although various methods of ionisation had been applied; the patient refused operation. What I finally succeeded with was an adaptation of an old method of getting through the chronic stricture of the urethra, using filiform bougies. This method I applied

to the sinus, using many zinc wires, and wherever I found a side track I put a zinc wire into it, so that I got a wire in every side pocket. After that was accomplished, the wires were all bound together externally and the current applied. Healing occurred after a single application. Many sinuses following upon lacerated wounds are likely to be of the same nature, and it occurs to me that this hint may prove useful to some members.

Dr. CUMBERBATCH: In the treatment of sinuses my method is to pack the sinus with a zinc rod and connect it with the positive pole. The method has been successful in some cases, but in others it has failed. When confronted with failure it is necessary to remember three things. First, the sinus may not be clear of foreign bodies. In one case a sinus was discharging a quantity of pus, and the orthodox zinc rod method failed. The case was sent back to the surgeon, who opened the sinus and found a piece of khaki in it of the size of the finger-tip, which had not been seen in the skiagram. After the removal of that the sinus healed up at once. Secondly, is the sinus a straight one? If the sinus surfaces are not all touched by the rod, pus will still form. In one such case I have had success by using a very fine brass tube as the positive electrode. I first wash out with water and saline, then zinc sulphate, and after passing the current one gets the disinfecting action of copper and zinc ions. Thirdly, one must make sure that the zinc used is a germicide. In many cases I have found it was not, because the ulcer or sinus had refused to heal. As an alternative I have successfully used a solution of iodine in potassium iodide—1 per cent. potassium iodide containing iodine dissolved to make it an additional 1 per cent. strength. It is not a case of simple solution of iodine and potassium iodide, but a chemical compound is formed, probably a tri-iodide. The new ion enters when the fluid is connected with the negative pole. By placing a solution of this in contact with the skin, the skin becomes discoloured a faint yellow, but by connecting the solution with the negative pole the skin becomes an intense orange or vermilion. Recently I had a case of ulcer on the knuckle which refused to heal with surgical treatment or with zinc ionisation, but at once yielded to iodine dissolved in potassium iodide. That being connected with the *negative* pole is one answer to the question raised by Dr. Batten. Another solution which has a germicidal action is sodium salicylate, and I have had a case which healed up with that after failure had been met with even from iodide.

Another point I wish to mention in connexion with the treatment of sinuses and wounds is the use of X-rays. Chronic suppurations and sinuses which have persisted for a long time and resisted other forms of treatment have yielded to X-rays, and here again further help will be derived by placing along the sinus a silver or tin rod.

With regard to the treatment of frost-bite, it is first necessary to have an exact definition of "frost-bite," so that all who use the term will be referring to the same condition. I have had two cases of frost-bite in the feet, of the anæsthetic type, and I have tried one foot of a patient with one method, and the other foot of the same man with another. I applied the rhythmic sinusoidal current to the worst foot of one case, and to the other I applied the galvanic current, the strength of which had been made to wax and wane. The foot treated with the sinusoidal current recovered much sooner than the other. In another bilateral case I treated both feet by diathermy, and the improvement, in looks and in feeling, began with the first application. In diathermy, I start off by using moist pads soaked in salt solution, but later I place pads on the skin, which has received a little preliminary moistening; and the result is that there are fewer burns than by the other method. I have produced two bad burns by using a damp cloth pad in surgical diathermy, because the salt solution was converted into steam, and this caused two large areas of necrosis, but it should be added that the patient was already moribund from malignant disease.

The PRESIDENT (Dr. W. Ironside Bruce): I am sure members have derived a great deal of instruction from the discussion, and I cannot close the meeting without saying how much I have been interested in Dr. Russ's remarks setting forth his own method of dealing with bacterial infection. I agree with Dr. Reginald Morton that there is something entirely new in it, which is likely to change the prevailing views concerning the electrical treatment of disease.

Electro-Therapeutical Section.

March 19, 1915.

Dr. W. Ironside Bruce, President of the Section, in the Chair.

Two Cases of Malignant Growth treated by Diathermy : (1) Carcinoma of Tongue ; (2) Carcinomatous Ulcer of Cheek.

By E. P. Cumberbatch, M.B.

Both the cases were inoperable. The ulcer of the tongue measured 1 in. by $\frac{2}{3}$ in., and there was much surrounding infiltration. The diathermic cautery was applied in January, 1914, and the patient remained in bed ten days after the operation. The patient said the ulcer completely healed six weeks later. The only present indication that anything had taken place was the appearance of the outer border of the tongue, which was slightly concave. It was now covered by a smooth layer of epithelium. The operation took ten minutes, and the result was better than could have been expected after the application of the knife.

The second patient, a man, aged 60, had a rodent ulcer on the cheek, in front of his ear. As a result of the application of X-rays some years ago it healed up, but latterly he developed an extensive ulcer, which proved to be squamous-celled carcinoma. It was treated by radium, but refused to heal. Last July the diathermy cautery was applied, and the edges and base of the ulcer were coagulated, and sloughed off. Smooth, supple skin could now be felt covering the site of the former ulcer.

DISCUSSION.

Dr. HUMPHRIS asked what amount of current was used, what the position of the indifferent electrode was, and whether a general anæsthetic was given.

Dr. WORRALL asked, in the case of the tongue, what was the length of time during which the current was allowed to flow, and whether more than one application was needed.

Dr. CUMBERBATCH replied that the amount of current used for the treatment of these growths was just sufficient to cause coagulation, as indicated by the change in colour. The amount of current to produce that depended on the extent of surface contact between electrode and tissue. With a single needle, ½ amp. would cause coagulation; with a disk a centimetre in diameter 2 amp. would perhaps be needed. In the cases shown he used an electrode measuring 1 cm. by ½ cm., with five prongs attached, and that required a current of 1·4 amp. He mostly used one active electrode in contact with the growth, and one indifferent electrode, placing the latter on the chest or other flat surface; if it did not make perfect contact, there was danger of severe burning. In nearly all such cases the patient was given a general anæsthetic. If local anæsthesia was used for growths on or near the face or throat there was risk of movement by the patient. If enough heat were used to produce deep coagulation the patient could not tolerate the application. The tongue case had only one application, and the coagulation time varied from five to ten seconds for each position of the active electrode; it depended on the strength of current put on originally. Experiments on excised tissues seemed to show that it made no difference whether a strong current produced the effect quickly or a weaker current acting more gradually.

(1) Bacteria moving during Electrolysis; (2) Changes produced in Coli Bacilli after Electrolysis.

By C. RUSS, M.B.

The first slide showed urine from a case of cystitis, in which the coli bacilli were undergoing no change; this was supplemented by the next slide, in which there was an elongation of the bacilli following on the electrolysis; there was also a change of reaction to the Gram stain, an evidence of chemical change in the bacterial envelope. He first produced the effect clinically, and then wanted to see if he could

cause the same effect artificially, using a fluid closely resembling that usually present in the bladder, though the actual character of the bladder fluid was varied with each drop of urine added to the bladder. He produced the elongated effect in sixty-six hours. He repeated the experiment thirteen times before he arrived at just the right strength of current, $\frac{1}{15}$ ma.—i.e., a non-lethal current.

DISCUSSION.

Dr. ETTIE SAYER said that last summer she had a severe case of pyorrhœa with abscesses in both jaws, enlarged cervical glands, and ulcerative colitis. She asked Dr. Eyre to make a vaccine for it. The organisms were *Streptococcus longus* and *Streptococcus pneumococcus*. In the early stage large quantities of streptococci and pneumococci were found in the fæces, but no abnormal *Bacillus coli*. For the colitis she gave abdominal galvanism. After three months another examination was made. The vaccine had been successful in destroying the streptococcus and pneumococcus, but the fæces contained large quantities of elongated blue coliform bacilli. She did not know whether their presence was due to the galvanic current or not, and would never have associated the two conditions, but for Dr. Russ's very interesting discoveries and the demonstrations which he had given them that night.

Dr. FINZI asked what amount of current Dr. Russ gave in these cases: the strength and the duration of the application.

Dr. DAVID ARTHUR asked whether, by further cultivations, the bacilli could be got back to their previous form.

Dr. BROWNING considered that the point made by Dr. Russ with reference to the lengthening of the organisms was an important one. Other means of inhibiting organisms like *Bacillus typhosus* and *Bacillus coli* produced the same effect, and no doubt the lengthening was in this instance also an evidence of inhibition. Ainley Walker, of Oxford, produced similar appearances by growing typhoid bacilli in a medium containing a small amount of an extremely inhibitory substance—namely, gentian or crystal violet. A considerable time ago, when he was himself studying the effects of active serum on growing organisms, he found exactly the same leptothrix appearance brought about by the inhibitory action of serum. The production *in vivo* of a more or less enduring mitigation of the pathogenic action of an infecting organism, which they were all anxious to achieve, seemed to have been effected with considerable success by Dr. Russ.

Dr. RUSS, in reply, said he was much interested in Dr. Sayer's remarks: the effects were similar to those he had been producing in the bladder. The

current used in the case must have been enormous compared with that which he employed in his tube; if he had used a stronger one he would have killed off the organisms. For cystitis, on the first occasion he did not usually give more than 1 ma. for forty-five minutes; and he had not yet found it necessary to increase the dose beyond 3 ma., except once when he gave 5 ma. During the first week he kept up the administration for an hour; during the second week for one and a half hours, and never more than one and a half hours. The long bacilli did shorten again in culture, just as Ainley Walker found. But they did not go back to their original form when the change had been brought about in the bladder. In the case he spoke of the effect was produced in four weeks, and he had kept in touch with it for eighteen months. Since the cessation of the treatment the bacilli in the urine had been gradually getting shorter. He had seen the lengthening in several cases of *Bacillus coli* cystitis.

The Removal of Foreign Bodies from the Tissues with the Aid of an X-ray Director.

By W. Lindsay Locke, M.B.

The localisation of foreign bodies in the tissues is a subject which has been discussed recently almost *ad nauseam*, but the method which I am about to describe, and which you, Sir, so ably demonstrated at a recent meeting of the Medical Society of London, presents features so essentially different from those with which we have become familiar that I venture to bring it again to your notice. I may say that I had the pleasure of working out the practical application of the method with our President, and it is at his suggestion that I bring it before the members of this Section.

With the methods hitherto in use the surgeon is shown a mark or marks on the skin and told the foreign body occupies a position relative to those marks. During the operation the marks are liable to be disturbed, and when so disturbed are of little further assistance; with this method a mechanical guide is provided and the line is indicated until the foreign body is reached.

The special apparatus required consists of a small addition to a couch, which though perhaps elaborate and costly may be easily adapted to do all general work, and then forms the most convenient piece of apparatus of its kind with which I am acquainted.

The essentials which must be observed are as follows: The X-ray

tube is placed in a box below the couch which is attached to an arm above the couch, the whole moving easily in all directions on a horizontal plane and capable of being fixed where required. On the end of the arm above the couch is arranged a vertical needle, and the tube is adjusted so that its central radiation coincides exactly with the

A, fixing band and buckle; B, needle with guide and stop; C, blunt graduated director; D, fluoroscope with central cross-wires; E, blunt director; F, sterilisable needle and director carrier; G, taper fixing pin for F and D; H, removable back for use at either end; K, hinged cross-arm; L and M, vertical adjustment slider; N and O, diaphragm stops; P^1 and P^2, clamping pedals; R, fixing and levelling screws.

axis of the needle. The needle is capable of movement up and down only on this line. Two needles are provided, sharp and blunt; the blunt needle is graduated in centimetres. As the operation is to be

done on the X-ray couch this may have to be placed in the operating theatre, and to make it possible to centre the foreign body in daylight, a small fluoroscope is provided which fixes on to the end of the horizontal arm in place of the needle carrier, and has cross-wires arranged so that the crossing lies on the needle track. The needles and their carrier are easily removed for sterilising purposes and always fit accurately into place again. The horizontal arm carrying the needle or screen may be raised or lowered to enable it to be placed near the surface of the part to be operated upon, and may also be swung vertically out of the way upon a joint specially provided for that purpose at its base.

In the use of this apparatus the technique would be somewhat as follows: An X-ray examination having been made beforehand, to decide the easiest way to approach the foreign body, and a mark having been made on the skin, the patient is placed on the couch and anæsthetised, and the part put into the position required and fixed there by means of sand-bags and straps. In arranging the position of the patient it should be borne in mind that the incision is, as a rule, to be vertically over the foreign body. The part is prepared for operation in the usual way and a sterile towel laid over it. With the screen on the end of the horizontal arm the whole tube box, cross-arm and screen are moved about as an orthodiagraph until the shadow of the foreign body lies with its centre at the crossing of the wires, in which position they are clamped rigidly to the couch by means of the pedal provided. The fluoroscope and its holder are now removed and the surgeon substitutes the sterilised director and its carrier. If no important structures intervene between the foreign body and the skin the sharp needle is chosen, and the surgeon will advance its point until it touches the skin, in which position he may make a small incision to facilitate the introduction of the needle, which is then pushed forward until it impinges on the foreign body. Contact between the needle and the foreign body may be felt or Sir James Mackenzie Davidson's telephone may be used to announce the fact. The horizontal arm and needle carrier are now pulled up so as to support the upper extremity of the needle while the surgeon cuts down alongside it to its point where the foreign body is found and removed. Should the foreign body lie in the neighbourhood of important structures where the use of the sharp needle is thought inadvisable, the blunt graduated director should be used, the depth of the foreign body having been ascertained beforehand. The procedure

is the same as when using the sharp needle, the point of the director being advanced till it touches the skin; the reading on the scale is then noted and the operation proceeded with, the director being swung into position when required to indicate the line and measure the depth at any stage of the operation. Provision is easily made for ascertaining the depth at which the foreign body lies. A scale is placed on the cross-rails below the couch to measure the tube shift, and another on the vertical extension which reads the distance from the anode to the tip of the blunt needle when the latter is in the zero position; this allows of accurate estimation of the depth of the foreign body by triangulation.

In conclusion, this method may be applied in all cases in which the foreign body can be seen on the screen, and it permits of the surgical removal of such from the tissues with expedition and certainty.

Electrodes for Diathermy and Static Treatment.

By W. J. Turrell, M.D.

Dr. Turrell exhibited some diathermy rheophores, designed to secure efficient insulation, flexibility, and complete protection of the patient from the effects of arcing in the event of fracture of the rheophore wires. He also showed some simplified patterns of diathermy electrodes for surgical purposes, a much enlarged and strengthened autochrome tank, manufactured at his suggestion by Messrs. Newman and Guardia, for the daylight development of radiographic plates, and an asbestos and rubber electrode for administering the static breeze.

Epidiascope Demonstration of Skiagrams demonstrating Bullet Injuries of Skull and other Wounds and Injuries, with Notes on Cases.

By W. J. S. Bythell, M.D.

The exhibitor explained that as he did not know until the previous evening that he could attend the meeting, the slides were not quite as announced in the agenda.

The first slide was a skiagram of a case in which a Belgian, while prone on the ground, received a bullet on the top of the skull; it traversed the brain substance, and lay embedded in the petrous bone. He also showed an antero-posterior view. The man had no cerebral symptoms of any kind. He was seen ten days after the injury, and was normal mentally and physically.

A slide of another case was shown in which the bullet entered the top of the head, and was found resting on the tentorium in the parietal lobe. A few days after receiving the wound he had complete hemiplegia, but within three weeks the whole of the paralytic symptoms had passed off; there was nothing left a month afterwards except a slight shuffling gait, equally on both sides. But now, six weeks after the wound, he was rather "soft," and was the butt of the other men.

Another case was that of a man recently admitted with a large shrapnel wound in the head. There were pieces of depressed bone, fragments of bullet, and the major part of the bullet shown. That man was exceedingly ill, and probably would die in a day or two. He had now complete hemiplegia, and was in a semi-comatose condition. The difference compared with the results in the other cases seemed attributable to the shattering effected, and the consequent brain destruction.

Another case was that of a man who, while lying on the ground, received a bullet on the end of the nose. It carried away the pre-maxillary part of the maxilla and went through the tongue, and was now lying alongside the fifth cervical vertebra. He saw the man two days after the wound, and there was much extravasation in the neck; but afterwards the only remaining symptom was complete paralysis of the left vocal cord, probably through the bullet having injured the vagus or the recurrent laryngeal nerve.

The next case was that of a man who received an empty German cartridge case in the muscle of his calf. He did not know whether this had happened through the Germans filling their shells with empty cartridge cases and other pieces of metal, or whether the cartridge case was forced in by a shell bursting near.

The next slide showed a bullet embedded in the medullary cavity of a long bone without any damage to the bone exterior. The negative showed no trace of fracture. The man, he believed, was again at the Front.

The next skiagram was from a German prisoner with a bad septic

wound in the leg. There was a mass of callus, and the skiagram clearly showed the gas track in the middle. It was necessary to amputate.

The last case was that of a bayonet wound in the thigh, and the skiagram showed the distinct shadow of myositis ossificans.

Prints illustrating Diagnostic Points in New Growth of Lung, Hour-glass Contraction of Stomach, &c. Skiagrams of Dermoid Cyst containing Teeth and Hair.

Shown by Robert Knox, M.D.

In reference to the last exhibit, the patient had a large palpable tumour in the pelvis. There was a large shadow on the right side, and several denser areas, which presented considerable difficulty; it was thought the dark bodies might be teeth. The presence of the tumour suggested a cyst, and a dermoid was thought to be the most likely form. Operation confirmed this, and a skiagram of the cyst was taken after its removal from the body. The cyst contained teeth, bone and hair.

Case of Foreign Body in the Left Bronchus.

By H. Annesley Eccles, M.D.

I venture to bring this case before the notice of the members of the Section, not because of its rarity, but because of some points of interest that it presents from the clinical, radiographic, and surgical aspects. The patient, a girl, aged 3½, swallowed a foreign body, the nature of which appeared to be doubtful, on February 9, 1915. A fit of choking ensued, which only lasted ten minutes. A soft œsophageal bougie was passed without meeting with any obstruction, and it was surmised that the foreign body had passed into the stomach. No untoward symptoms arose until February 25, sixteen days after the foreign body had been introduced, when a slight cough developed, and the breathing after exertion became noisy. This was accompanied by a slight dry râle all over the chest, but there was no rise of temperature. On the

twenty-fourth day the temperature rose to 101° F., and the air entry was found to be deficient on the left side of the chest. On the twenty-sixth day the skiagram shown was taken. The foreign body was now seen to be a long pin, which had lodged in the left bronchus with the point upwards. It could not be observed on screen examination. It is less common to find the foreign bodies in the left than the right bronchus, the proportion being about one to three.

The patient was placed under the care of Mr. Norman Patterson, who operated on the twenty-eighth day. Chloroform anæsthesia was used, combined with local cocaine anæsthesia. The bronchoscope was passed with some difficulty owing to the small size of the air passages. The pin was eventually seized by forceps, and removed together with the bronchoscope. The patient recovered rapidly with no sequelæ.

A Note on a New Sign in the X-ray Diagnosis of Pulmonary Tuberculosis.

By Stanley Melville, M.D.

Dr. Stanley Melville suggested that limitation of the movements of the diaphragm was overrated as a valuable diagnostic sign in early pulmonary tuberculosis. Even a greater restriction of movement was frequently seen in inflammatory conditions of lung and pleura; while, in the case of mouth-breathers and in the majority of women, the diaphragm was not extensively used as a muscle of respiration.

Sir Robert Philip, of Edinburgh, for many years had taught the value of what he felicitously termed "Tidal Percussion," in relation to the *functional activity* of the lung; and it was to the application of this in radiology that the speaker was anxious to draw the attention of the meeting. The term "tidal percussion" meant the difference between the resonant note obtained during inspiration and expiration, the tidal change in the healthy lung being considerable. He would not venture upon a discussion on the clinical aspect of the question: Sir Robert Philip's writing on this subject was, however, extremely interesting, though the view taken did not appear to have met with anything like universal acceptance among clinicians.

Having regard to the principle that limitation of the tidal percussion depended upon the degree of lessened expansion of the lung (and it was

convenient to study this at the apex of the lung), the following were the observations that he had made, so far as the investigation had been carried. In the normal lung, during full inspiration, the expansion of the apices was equal, and it was possible to see, above the clavicle, the posterior ends of the two upper ribs and, possibly, the upper border of the third rib; further, and this he regarded as important, the two upper intercostal spaces were of equal width.

In emphysema usually the upper three ribs could be seen above the clavicle, and the intercostal spaces, though still of equal width, were widened. In lessened expansion, due to interference with the air entry into the ascending bronchus, not only was a much smaller area of the bony framework of the thorax visible, but the intercostal spaces were definitely narrowed, the two upper ribs being frequently so close together that no translucent lung could be made out. In several skiagrams which he showed, illustrating these differences, in a pulmonary root lesion the space between the first and second ribs was practically obliterated, while in a dense fibrotic lesion of the region of the upper lobe the first and second spaces were much narrowed, and there was no lung tissue to be seen in the first intercostal space.

While he considered it more convenient to estimate this degree of lessened expansion during the screen examination, he would emphasise the necessity there was that the central rays of the X-ray tube should always bear the same relation to the part under examination. An arbitrary point was taken in his work, this point being the level of the third costal cartilages with the sternum.

He hoped others would follow out the investigation in their own work, and that the subject might be brought up again at a subsequent meeting of the Section.

Demonstrations.

By J. A. Codd, M.D.

Lantern slides of (1) an improved tube-stand. The majority of tube-stands are arranged so that the long axis of the tube is vertical, and in many positions of the tube for treatment the cathode stem is in the way, and comes in close contact with the patient's body. For therapeutic purposes the tube should have its long axis horizontal when

the tube box is in the normal position, and to secure this in the case of the type of tube box the exhibitor has used, he has replaced the straight arm which carries the ball and socket joint by an arm bent at a right angle, and finds that this simple change gives greatly increased facilities for approaching the tube to incurved surfaces such as the axilla, the side and front of the neck.

(2) A therapeutic chair arranged like a laryngoscopic chair, except that, at each side, there are additional sockets for the reception of the arm that carries the head-rest. By placing the head-rest in one of these extra positions the head may rest comfortably upon it and so open out the angle between the head and the shoulder, and thus facilitate close applications to the neck.

(3) Records of visceral movements by the use of colour tracings. In the case of an actively moving viscus tracings are made on the lead glass covering the fluorescent screen at the different stages of the movement, each stage being represented by a different colour. The tracings are then transferred to translucent paper, each phase of the movement being represented by a different colour, so that the interlacing outlines can be easily distinguished, the order of sequence can be represented by a series of corresponding coloured lines in the margin, and the duration of any phase can also be indicated in the margin.

M. Luc Hertoghe (a member of the Belgian Ambulance Corps, introduced by Dr. Jordan) exhibited a Belgian 75-mm. shell, which was fired against the Belgians by the Germans who had captured some of the guns and ammunition at Antwerp. Also a specimen of the aerial arrows, dropped in bundles of 250 by the Belgian airmen.

Electro-Therapeutical Section.

April 16, 1915.

Dr. W. Ironside Bruce, President of the Section, in the Chair.

The late Dr. H. Lewis Jones.

Dr. Reginald Morton said that, as one of the old members of the Electro-Therapeutical Society, who had a share in bringing that Society into the brotherhood of the Royal Society of Medicine, and who had been very regular in attendance at its meetings, he assured his hearers that at no time had members met in such a gloomy mental atmosphere as they did at this moment, owing to the loss which had been sustained by the death of Dr. Lewis Jones, for, in his passing away, the specialty had suffered a loss which could not be made good. Dr. Lewis Jones was truly the father of electro-therapeutics, so far as the British Empire was concerned. From the time that their friend took charge of the Electrical Department of St. Bartholomew's Hospital, in 1889, electro-therapeutics began to take an upward trend; and the secret of that lay in the fact that Dr. Jones was very scientific and thorough, and his attitude was absolutely correct. The specialty had often been regarded with scorn, but matters greatly improved when he took it in hand, and he maintained his hopeful spirit, and never sought to retaliate against its critics; and if he offered an answer it was very effective by reason of his confident yet incisive manner. Unfortunately, his health began to fail, and when he suffered the great loss of his son, who went down in the *Hawke* he was utterly crushed. A pathetic note received from Dr. Lewis Jones at that time showed he had received a blow from which he was not likely to recover.

Dr. Jones was a reserved man, but of most kindly and genial nature; and a great point to be remembered about him was the encouragement he gave to young aspirants in electro-therapeutics

and radiology. To the speaker he had always been most helpful, both in matters scientific and in things more mundane, and one always felt the better from having consulted him. Only those who were more or less intimate with Dr. Jones could realise how much the profession had lost. He valued the privilege of being invited to propose the following resolution :—

> "That this Section wishes to express their deep sense of the very serious loss that has been sustained in the death of Dr. Henry Lewis Jones, not only by the Section, but by all those interested in electro-therapeutics and radiology, and also to offer their most sincere sympathy to Mrs. Lewis Jones in the double loss of her husband and only son within a few months of each other."

Dr. CUMBERBATCH desired to second the resolution proposed by Dr. Reginald Morton. His own personal knowledge of Dr. Lewis Jones did not extend further back than the year 1911, but he soon discovered what manner of man he was—a skilled physicist and an able physician. Whenever he appealed to Dr. Jones for advice, he acted as a kindly light leading him through the encircling gloom ; and he thought all present would agree with Dr. Reginald Morton that the deceased was the father of the school of electro-therapy in the British Empire. He was its most influential teacher and most distinguished member. From what he had learnt from friends and colleagues of the deceased, he knew that in early life Dr. Jones was a prominent athlete and a distinguished classical scholar.

The resolution was carried in silence by members rising in their places.

Report of the Sub-Committee on the Standardisation of the Opaque Meal.

DR. REGINALD MORTON, in presenting this Report, said that eighteen months ago, when this Sub-Committee was formed, the need for a standard meal was felt, because there were workers all over the country, each of whom had his own particular form of meal. In regard to the best meal for ordinary purposes, the whole Committee was in agreement ; but in one particular Dr. Jordan stood out, and that gentleman's report was separately presented as a Minority Report. There had been no precise quantities laid down.

MAJORITY REPORT OF THE SUB-COMMITTEE OF THE ELECTRO-THERAPEUTICAL SECTION OF THE ROYAL SOCIETY OF MEDICINE ON A STANDARD OPAQUE MEAL FOR RADIOGRAPHIC EXAMINATION OF THE ALIMENTARY CANAL.

(1) The standard meal can consist of either bread and milk or porridge (Note 1).

(2) The total bulk of the meal should be about half a pint.

(3) The meal should be mixed with 2 oz. of barium sulphate or 2 oz. of bismuth oxychloride (Note 2).

(4) The meal should be taken as nearly as possible on an empty stomach.

(5) No aperient or other medicine should be taken within thirty-six hours of the first examination, and if the bowels are not opened naturally, an enema should be given on the morning of the examination.

Note 1.—(*A*) Preparation of bread and milk: 2 oz. of white bread, without crust, cut into small cubes, are placed in the bowl from which the meal is to be taken. 8 oz. of ordinary or malted milk are boiled in a separate vessel with 2 oz. of bismuth oxychloride or 2 oz. of barium sulphate; this mixture is stirred and poured over the bread. Sugar is added to taste.

(*B*) Preparation of porridge: 7 oz. of porridge made from the finest oatmeal are mixed with 2 oz. of bismuth oxychloride or 2 oz. of barium sulphate, and sufficient milk to make the total bulk up to 10 oz. The patient adds as much brown sugar as he likes.

Note 2.—(*A*) Bismuth carbonate neutralises about 22 per cent. of the free acids of the stomach, but there is no evolution of gas, as the carbon dioxide is dissolved as rapidly as it is produced (H. Finnemore and A. E. Barclay). The reduction in the acidity of the gastric contents tends to reduce the motor activity of the stomach and to interfere with the normal action of the pylorus.

(*B*) (i) Bismuth oxychloride is slightly more opaque to the X-rays than bismuth carbonate (R. Morton).

(ii) Bismuth oxychloride is about one and half times as opaque to the X-rays as an equal bulk, and twice as opaque as an equal weight of barium sulphate (R. Morton).

(Signed) A. E. BARCLAY,
A. F. HERTZ,
REGINALD MORTON,
S. GILBERT SCOTT.

MINORITY REPORT.

I wish to point out that the standard meal here described and the method of giving it are not, in my opinion, suitable for the investigation of chronic intestinal stasis. For this purpose I recommend an emulsion containing 4 oz. of carbonate of bismuth mixed with sugar of milk and water, to be taken within two hours after an ordinary breakfast, no purge or enema having been given. The details of the procedure are explained in the *British Medical Journal*, November 22, 1913.

(*Signed*) A. C. JORDAN.

DISCUSSION.

Dr. REGINALD MORTON moved "that the Majority Report of the Sub-Committee be adopted by the Section."

Dr. A. F. HERTZ said he thought it would be desirable to add a note that barium sulphate was preferable, at any rate for hospital use, as it was very much cheaper than bismuth oxychloride and equally good for radiographic examinations. By using barium sulphate, Guy's Hospital had saved about £50 per annum.

Dr. BARCLAY supported Dr. Hertz's remarks, and seconded Dr. Morton's motion.

Dr. METCALFE stated that he agreed with the general conclusions as to the opaque material and the quantity of the meal to be given; but he would like to ask the Sub-Committee whether they had any suggestions to offer as to the flavouring of the meal, so that it would be somewhat more palatable than the ordinary opaque meal. Owing to disordered digestion, such meals were often repugnant to the patient, and an exceptional X-ray appearance of the viscera was sometimes produced. He favoured the addition of a certain quantity of chocolate or cocoa—the latter preferably in the form of what was commonly known as "Homœopathic Cocoa"—i.e., containing arrowroot and other things in addition to the cocoa. If the mixture were made more attractive, there was the likelihood that better and more uniform results would be obtained.

Dr. JORDAN agreed with Dr. Metcalfe that the meal should be made agreeable, but with regard to flavouring, the difficulty arose that one needed to know in advance the personal preference of each patient. Chocolate was perhaps the most generally approved by patients, but some disliked it, and others objected to vanilla or to peppermint. He thought there was room for two kinds of opaque meal: a solid preparation which was really a "meal," and

an emulsion (such as he recommended in the Minority Report) which rendered opaque the meal already in the stomach. When the decision was made to give a patient a solid opaque meal, he had one bit of advice to offer—to let the patient come for it as hungry as possible!

Dr. BAILEY said that, personally, he was fond of cornflour, and there were many people who did not like oatmeal but had no objection to cornflour. He asked whether it was not desirable to make reference to the more solid substance required in cases of stricture of the œsophagus.

The PRESIDENT commented on the quietness with which the proposal for a standard oqaque meal had been received by the Section. He hoped that did not mean that some did not propose to fall in with it; he hoped all would do so, because it would make a good deal of difference in examinations and the comparisons of results if the same method were used by all. Bread-and-milk and porridge were the substances selected because one or other was acceptable to most people. Immediately the question of flavouring was entered upon a difficulty arose, for tastes were very diverse. He regarded Dr. Hertz's suggestion as to barium sulphate as an excellent one; the saving in a big institution effected by using barium sulphate in preference to bismuth oxychloride was an important matter, and a reference to it should be added to the Report of the Sub-Committee.

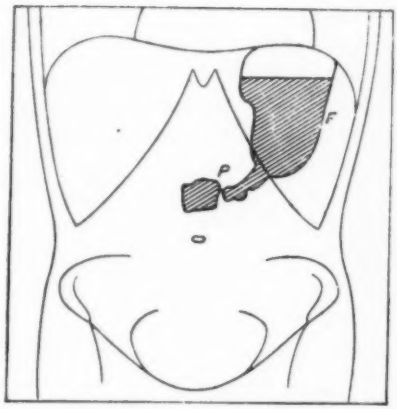
Dr. REGINALD MORTON replied that the Sub-Committee discussed the question of flavouring of the meal, but decided not to lay down rules which were too precise; their object was to form a basis, and it was felt that free discretion might be left as to flavouring, especially as, in the words of Dr. Jordan, it would be necessary to know the taste of the person in advance. He agreed that everything should be done to make the meal as little objectionable as possible. With regard to Dr. Hertz's suggestion, he would be glad if bismuth oxychloride could be left out altogether, and barium sulphate be recommended for all cases. He had had some cases in which the barium seemed to accelerate the digestion of the meal, but there was not sufficient difference in the action of the two substances to warrant the more expensive substance being recommended. In answer to Dr. Bailey's suggestion, cases of stricture of the œsophagus were in a different category, and obviously a stiffer pabulum was required, and less of it; but the Sub-Committee were concerned with derangements of the ordinary digestive system. He would like, with the permission of the Section, to add Dr. Hertz's suggestion to the Report. This was agreed to, and the Majority Report was formally adopted.

Some Alimentary Canal Cases of Radiological Interest.

By Arthur F. Hertz, M.D.

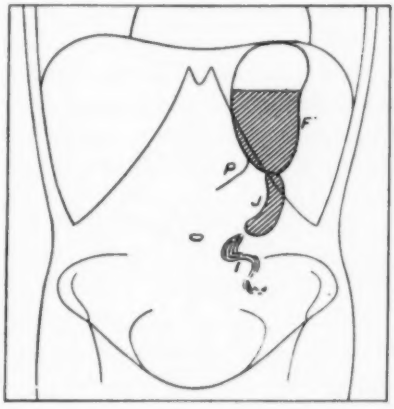
Case I: Achalasia of the Cardia (so-called Cardiospasm).—This case has already been described in the *Proceedings* (Clinical Section), 1914, p. 22.

Case II: Syphilis of the Stomach.—Mr. G., aged 33, had syphilis in 1901. In 1909 he began to suffer from indigestion; his appendix, the lumen of which was partly obliterated, was removed in December. He was better for a time, but in June, 1911, he complained of pain in the right hypochondrium, which was relieved by vomiting and by careful dieting, also of flatulence, wasting and constipation, with slight tenderness beneath the right rectus. An X-ray examination is said to have shown that the stomach was normal, except that there was considerable delay in its evacuation, which was supposed to have been due to a duodeno-jejunal kink, and a diagnosis of intestinal stasis was made. In April, 1912, Dr. Ironside Bruce found that the normal gastric outline was obliterated in the pyloric half of the stomach (fig. *a*); a gastro-enterostomy was performed in May, 1912, by Mr. Peter Daniel. No ulcer was found, but the pylorus was rigid and the mucous membrane of the pyloric end of the stomach was hard and granular in appearance. There was only temporary improvement, and when I saw the patient with Mr. Daniel in February, 1913, he was suffering from severe pain over the whole of the upper part of the abdomen, which was worst about four hours after meals and often awakened him at 2 a.m. The symptoms were similar to those he had before the operation, except that he now did not vomit. An X-ray examination (fig. *b*) showed that the food left the stomach very rapidly by the stoma, and the pyloric end of the stomach was completely obliterated. As it was thought that the condition might be due to syphilis, a Wassermann reaction was tried and found to be positive. Mr. Daniel therefore gave the patient three injections of neo-salvarsan. By April he was completely well, and when seen in March, 1915, two years after the salvarsan injection, he told me that he had had no return of symptoms and was able to take full diet without any discomfort. An X-ray examination showed no



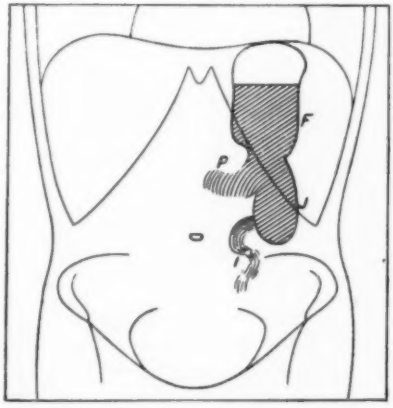
(*a*)

April, 1912. (From skiagram by Dr. Ironside Bruce.)



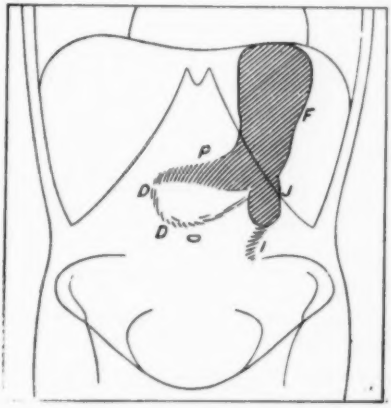
(*b*)

February, 1913. After gastro-jejunostomy.



(*c*)

March, 1915. Two years after salvarsan treatment. Standing.



(*d*)

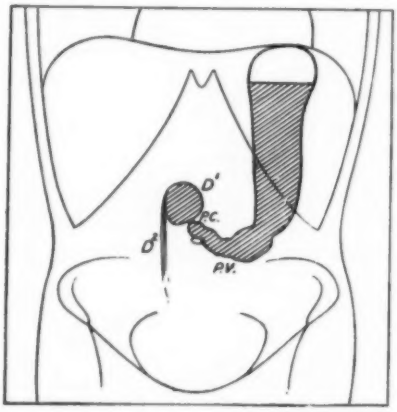
March, 1915. Lying down, the patient having turned on his right side for two minutes.

Case II: Syphilis of the stomach.—F, fundus; P, pyloric end of stomach; D, D, duodenum; J, jejunum, just beyond anastomosis; I, small intestine beyond J.

great alteration except that a narrow channel was now present through the pyloric end of the stomach (*c* and *d*).

There seems no doubt that this was a case of gumma of the stomach; such a possibility should therefore be borne in mind whenever the appearance, which is generally regarded as pathognomonic of cancer of the stomach, is seen, as the condition ought to be curable without operation.

Case III: Carcinoma of Stomach causing Pyloric Incompetence.—Mr. P., aged 78, had had an excellent digestion until two months before I first saw him, when he began to suffer from loss of appetite, flatu-



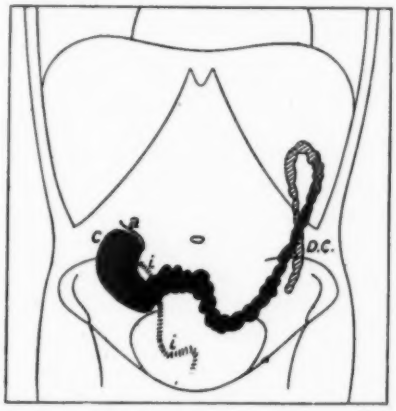
Case III: Carcinoma of stomach causing pyloric incompetence. — P.V., pyloric vestibule infiltrated with growth; P.C., pyloric canal; D^1 and D^2, first and second parts of duodenum.

lence, and pain immediately after meals. There was no vomiting, and although he still ate a moderate amount of food, he had lost 20 lb. since the onset of symptoms. He was formerly very vigorous, but now felt extremely weak. His bowels were regular. Nothing abnormal could be felt on palpation. The X-rays showed that the whole of the pyloric end of the stomach was infiltrated by growth, the outline of the shadow being irregular and the peristaltic waves ceasing at a point about 3 in. from the pylorus. In spite of this the food passed with extreme rapidity through the pyloric canal, which was widely open, into the duodenum, the first part of which—the "pyloric cap"—looked abnor-

mally large, but was really simply distended as a result of the rapid passage of food from the stomach. There was no delay in the passage through the rest of the duodenum or intestines.

I believe that the condition of pyloric incompetence seen in this case is a common precursor of the pyloric obstruction caused by cancer. It is a result of infiltration of the muscular tissue preventing the normal contraction of the pyloric sphincter at a period before the invasion of the latter is sufficient to cause obstruction. Such a case shows the importance of early X-ray examination, by means of which cancer of the pyloric end of the stomach may be recognised before the more obvious symptoms due to pyloric obstruction have appeared.

Case IV: Appendicitis with Undescended Cæcum; Gastric Anti-peristalsis without Pyloric Obstruction.—Mr. C., aged 36, complained



Case IV: Appendicitis with undescended cæcum. *a*, appendix; C, cæcum; D.C., descending colon; *i*, *i*, terminal loop of ileum.

of constant pain in the right hypochondrium for four months. It was always aggravated by exertion, but had no special relation to meals. It was sometimes severe enough at night to keep him awake. He frequently vomited within an hour or two after meals, the food being partially digested and mixed with very sour fluid. The upper part of the right rectus was found to be very rigid, and he was very tender in the region of the duodenum, so that, in spite of the absence of any characteristic relation between the pain and the time

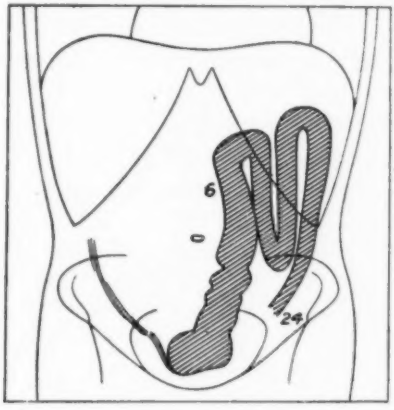
of meals, the possibility of duodenal ulcer had been suggested. An X-ray examination showed, however, that the stomach was normal in size, peristalsis being active but somewhat irregular, as an occasional feeble anti-peristaltic wave passed from a point about 3 in. from the pylorus on the greater curvature at the same time as a normal peristaltic wave started from the same point on its way to the pylorus. There was no delay in the evacuation of the stomach, and there was no stasis in the ileum, the end of which rose out of the pelvis to join the cæcum, which was situated above the iliac crest and formed the beginning of a somewhat dropped transverse colon. There was no trace of any ascending colon, and the appendix was clearly seen passing from the inner side of the cæcum upwards and inwards until it emerged above its highest point. Its position corresponded with that of the pain, and palpation under the screen showed that the cæcum itself and the duodenum were not tender, the tenderness being confined to the appendix. Mr. E. C. Hughes removed the appendix, which showed signs of chronic inflammation, its situation corresponding to what was seen with the X-rays; the duodenum was normal. The patient has been free from symptoms since the operation was performed two months ago.

This case is also noteworthy from the fact that reversed peristalsis was seen in the stomach, although there was no pyloric obstruction. The only other instance I have seen of reversed peristalsis in the absence of obstruction was also a case of chronic appendicitis.

Case V: Appendicitis with Colon situated entirely on the Left Side of the Abdomen.—Mr. S., aged 22, has had frequent attacks of severe pain ever since he was poisoned with bad meat four years ago. The attacks are very severe and come on without obvious cause in the lower part of the abdomen. When I first saw him in April, 1914, he was having as many as two a day. An X-ray examination showed an extraordinary abnormality of his colon; the whole of it was situated on the left side of the abdomen, the end of the ileum passing downwards on the right side to join the cæcum, which was in the left side of the pelvis. It was thought that the symptoms might be due to appendicitis, so Mr. F. J. Steward operated and found the appendix was slightly diseased and was lightly adherent in the pelvis. The cæcum had a very large mesentery. The appendix was removed, and the patient remained well until the end of July; since then he has had an occasional slight attack of pain, but never as severe as before the operation.

A second X-ray examination showed that the intestinal condition was unaltered, and that there was no stasis.

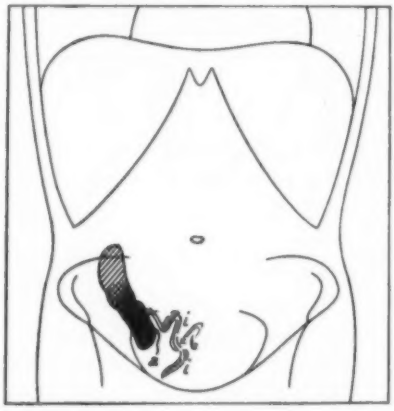
I am unable to explain by what developmental process the colon should be in such an unusual position.



Case V: Colon situated entirely on the left side of the abdomen.

Case VI: Inflammation of Appendix which was said to have been removed.—Mr. M., aged 19, was operated upon when aged 5 for an appendicular abscess; the appendix was supposed to have been removed, but as the surgeon is now dead it was impossible to obtain confirmation of this. He remained perfectly well until he was aged 12, when he began to have attacks of abdominal pain. At first there were not more than two a year, but during the last six months a week has rarely passed without one or two attacks. They generally last only ten minutes, but occasionally as long as three hours. They may occur at any time, but are especially likely to be brought on by strenuous exercise; they have sometimes followed an hour or an hour and a half after a meal. The pain is always situated in the neighbourhood of the umbilicus, but on one recent occasion it was followed by a less severe pain in the right iliac fossa. The pain is often very severe; it develops gradually but disappears suddenly. The bowels are regular. Examination showed that there was some tenderness in the right iliac fossa. With the X-rays I found that the stomach, which was somewhat atonic, emptied itself within six hours of the barium meal, nothing having been

eaten in the interval; an abnormally large proportion was then present in the end of the ileum, the cæcum and ascending colon being also visible. A shadow, which looked as if it might be the appendix, was visible between the end of the ileum and the cæcum. Three hours later only a small quantity of barium was left in the ileum, the rest being in the cæcum and ascending colon, none having passed beyond the hepatic flexure. The appendix was now clearly visible, and it was found to be extremely tender, the end of the ileum and the cæcum being entirely free from tenderness. The appendix was quite movable, and the cæcum, which dipped into the true pelvis on lying down, could



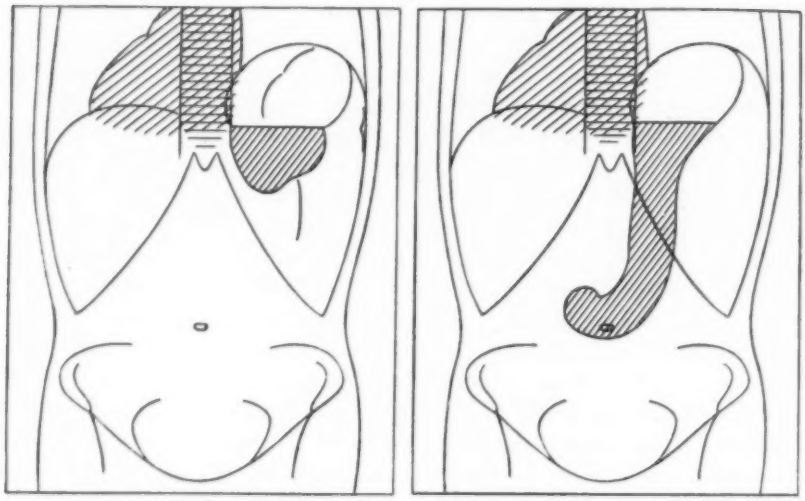
Case VI: Inflammation of appendix, which was supposed to have been removed. Tracing taken nine hours after barium meal. *a*, appendix; *i*, *i*, end of ileum.

be raised about 1½ in. by deep palpation. The appendix remained the only tender point, even when it was moved a couple of inches from the position in which it was first seen, so that it was clear that the tenderness was due to the appendix itself, and was not a referred muscular tenderness.

Shortly afterwards Mr. Warren Low removed the appendix, which showed evidence of chronic inflammation. Its terminal quarter of an inch was completely separated from the rest by a short fibrous cord. The patient has had no return of symptoms.

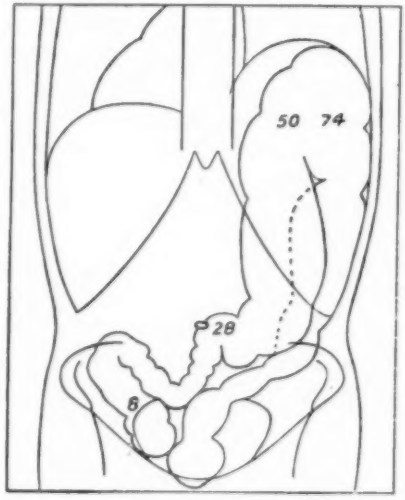
Case VII : Heart pushed over to the Right Side of the Chest by Dilated Splenic Flexure.—A lady, aged 50, had suffered from severe constipation for many years, and on one occasion had gone twenty-six days without an action. I found that her heart was situated entirely on the right side of the chest, its outer border being 3 in. from the middle line, but her medical attendant was quite certain that the last time he examined her some years before it was in a normal situation. Neither physical examination nor the X-rays showed the presence of anything in the right side of the chest which could have drawn the heart over, or on the left side of the chest which could have pushed it over, but the highest point of the left side of the diaphragm reached the level of the third costal cartilage, the right side being only on the level of the fourth intercostal space, whereas the diaphragm is normally at the level of the fifth costal cartilage, the right dome being slightly higher than the left. This abnormal position was due to an enormous dilatation of the splenic flexure; the constipation was found to depend entirely upon delay in the dilated part of the colon. There was no evidence of any organic obstruction; the stomach also showed a somewhat remarkable condition, which was apparently the result of pressure by the dilated splenic flexure. When the barium meal was first taken, it all accumulated in the fundus and gave the impression that there was an organic obstruction in the centre of the stomach leading to an hour-glass condition (*a*). That this was not really the case was shown by the fact that a second barium meal on a later day passed without difficulty through the whole stomach, the appearance of which was normal in every way (*b*). Massage of the dilated colon, which the patient could bring within reach by breathing deeply, resulted in considerable improvement, so that she was able to keep her bowels regular with six or eight senna pods and a tablespoonful of paraffin every night. Her general health also improved, but there has up to now been no change in the position of the heart.

I have been able to find no other recorded case, in which the heart was pushed over to the right side as a result of dilatation of the splenic flexure.



(*a*) Stomach with central spasm.

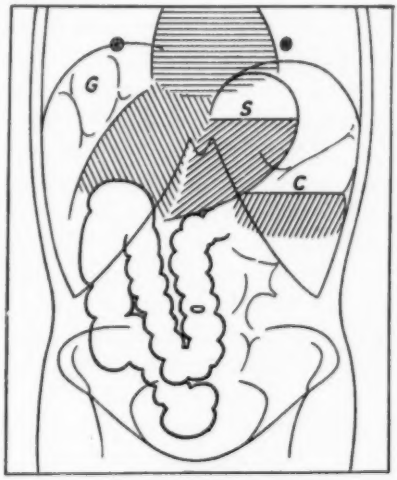
(*b*) Stomach with spasm relaxed.



(*c*) Composite drawing of colon. The numbers represent the hours after the barium meal at which different points were reached.

Case VII : Heart pushed over to the right side of the chest by dilated splenic flexure.

Case VIII : Hirschsprung's Disease in an Adult without Symptoms.—Mr. K., aged 35, 6 ft. 7 in. in height and weighing 15 st., had always enjoyed good health and was a noted athlete. Whilst in England and on the East African coast, where he is an official and where the climate is not very trying, he is perfectly well, his bowels being opened twice a day. He has to make frequent expeditions to the interior, where the heat is very great, and he perspires excessively; at the same time his meals are irregular, and he is unable to obtain green vegetables, so that, although he rides for five or six hours a day, he at once becomes constipated. When his bowels have not been opened for four or five days he



Case VIII : Hirschsprung's disease in an adult without symptoms.—S, upper level of fluid contents in stomach; C, upper level of fluid contents in dilated segment of colon; G, gas in colon *above* liver.

takes gr. iv calomel in the evening and an ounce of salts in the morning; a normal stool results without any pain. He consulted me in order to know what steps he should take in order to keep his bowels regular whilst on his expeditions.

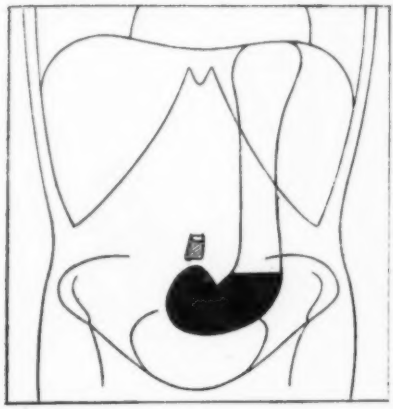
My examination showed that his colon was abnormally long and dilated, but the chief dilatation was beyond the middle of the transverse colon. The exact anatomical relations could not be made out, but an enormous dilated sac of colon pushed up the left side of the

diaphragm and contained semi-fluid fæces, the upper surface of which could be clearly seen distinct from and below that of the gastric contents. A part of the dilated colon was also above the liver, so that the gas-containing bowel could be clearly seen under the right side of the diaphragm. A finger inserted in the rectum passed straight into an enormously dilated sac. In spite of this remarkable condition there was no intestinal stasis.

This is apparently a case of Hirschsprung's disease, in which the hypertrophy of the intestinal musculature has produced compensation.

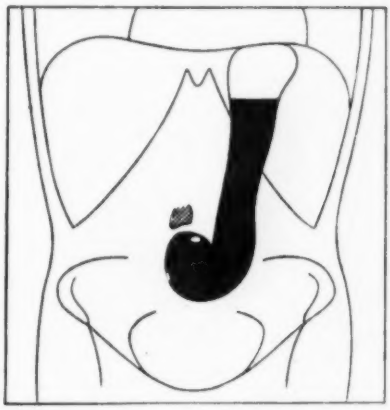
Case IX: Atonic Dilatation of the Stomach cured by Treatment.—Mr. H., aged 45, had an attack of acute indigestion after a meal of oysters and beer at Easter, 1913. Since then he had suffered from a sense of fullness after meals, which changed into a hot burning sensation in the course of a couple of hours. In January, 1914, he began to lose weight, and when I first saw him in July he had lost 2 st. He felt slack and complained of giddiness in the morning. There was no tenderness nor rigidity, and an X-ray examination showed that he had well-marked atonic dilatation of the stomach. He was treated by rest in bed with an absolutely dry diet, all fluid being given by rectum; at the same time his stomach was massaged. Improvement was very rapid, and the X-rays showed that the tone of his stomach returned to normal at the same time as his weight increased and his symptoms disappeared. There has been no return of symptoms.

Case X: Gastroptosis cured by Treatment.—An unmarried lady, aged 52, suffered from indigestion, severe constipation, and general weakness. The tone of her stomach was found to be normal, but a considerable degree of ptosis was present (*a*), which was due to the very flabby condition of her abdominal muscles. She was given an abdominal support and had regular massage and exercises, with the result that the condition of her muscles steadily improved in spite of the fact that she had no rest in bed. The position of her stomach had risen to normal when I saw her fourteen months after the first examination (*b*). She was now able to do without aperients but still used a little paraffin. She then gave up the abdominal support but continued to have massage at intervals, with the result that four months later the stomach had actually become slightly hypertonic, the greater curvature being just above the umbilicus (*c*). She was now also able to get her bowels open without even using paraffin.



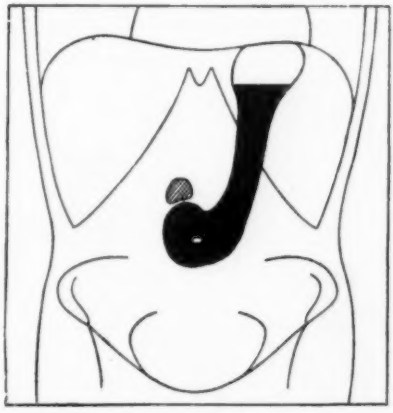
(*a*)

July 17, 1914.



(*b*)

July 21, 1914.

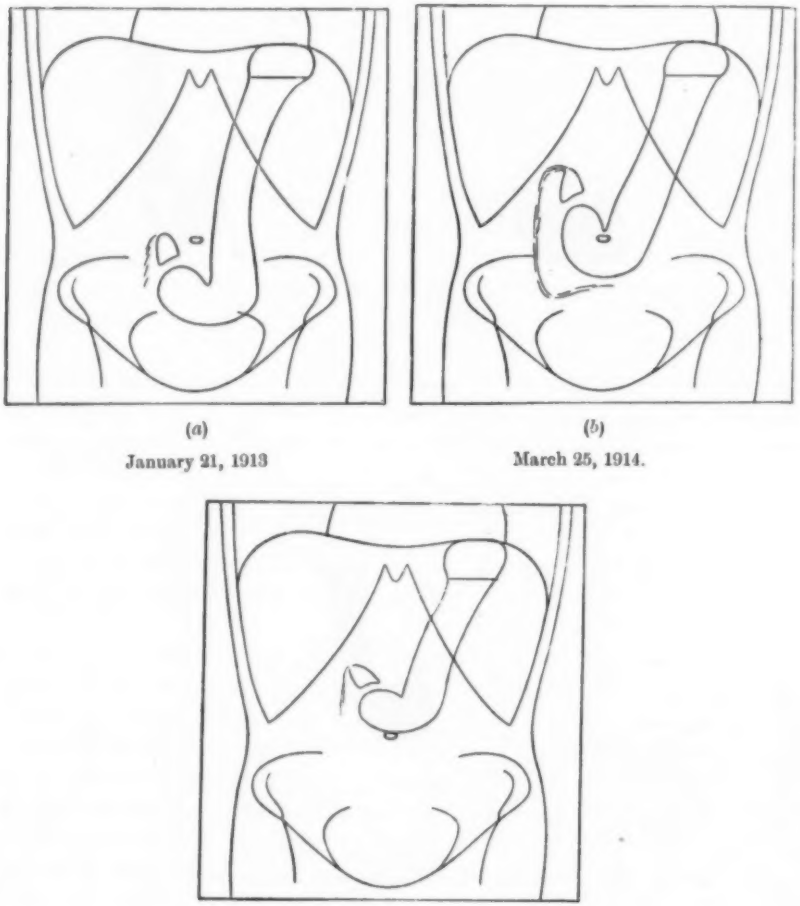


(*c*)

September 16, 1914.

Case IX : Tracings showing result of treatment of atonic dilatation of the stomach.

Case XI : Ptosis of the Colon with Severe Intestinal Stasis and Symptoms of Intoxication cured by Rest and Massage.—A girl, aged 14, had suffered from constipation since infancy. It had been getting worse



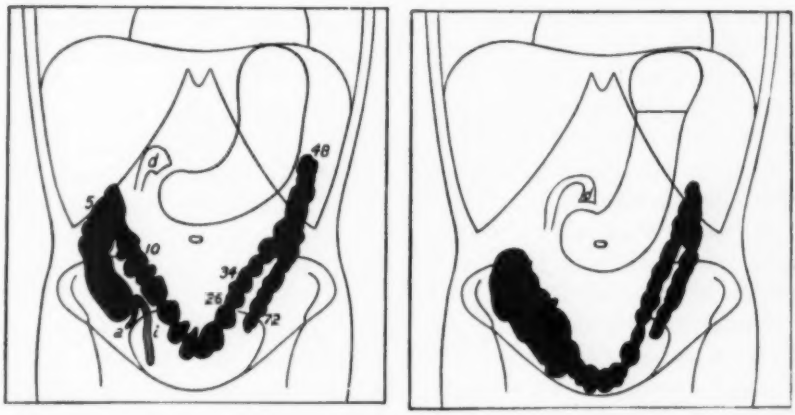
(*a*)
January 21, 1913

(*b*)
March 25, 1914.

(*c*)
July 21, 1914.

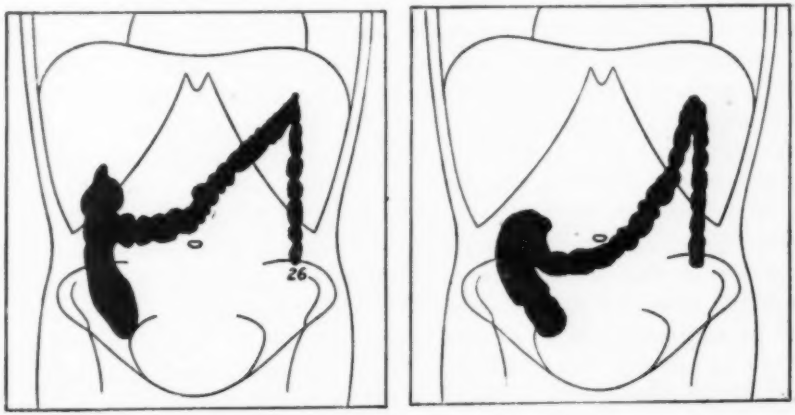
Case X: Gastroptosis cured by treatment.

the last few years, during which she had five attacks of fæcal obstruction. Her stools constantly contained mucus. She suffered from perpetual



Horizontal. Vertical.

(*a*) September 10, 1913. Composite tracings showing outline of stomach and duodenal cap (*d*), and shadows of terminal ileum (*i*), appendix (*a*), and colon. The ileum was not empty until forty-eight hours had elapsed, and the cæcum was still full after seventy-two hours. The numbers represent the hours after the meal at which different points were reached. Weight, 7 st. 12 lb.



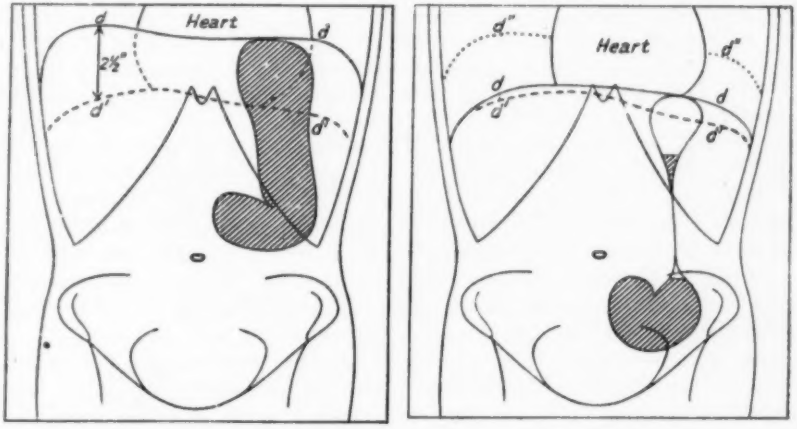
Horizontal. Vertical.

(*b*) October 29, 1913. Tracings taken twenty-six hours after barium meal; some of the barium had already been passed. Weight, 9 st. 7 lb.

Case XI: Ptosis of colon with severe intestinal stasis cured by rest and massage.

headaches, pains in her limbs and body, and she had an exceedingly small appetite. Her breath was always foul and her tongue furred; she was very depressed and irritable. An X-ray examination showed that there was no stasis of the stomach, but a slight degree in the end of the ileum. There was an extreme degree of stasis through the whole colon. The transverse colon was very low even in the horizontal position. The ptosis was probably due to the accumulation of large quantities of fæces in it, because no other organ had dropped with it. The intestinal stasis, the ptosis of the colon, and the toxic symptoms were so severe that a continuation of medical treatment was only advised as a forlorn hope, and it was expected that a colectomy would ultimately be required. The patient was kept in bed for five weeks. Every morning after her bowels had been opened she was given abdominal massage by a nurse, who had been shown under the X-rays how she could manipulate the colon into its normal position. She was ordered a tablespoonful of liquid paraffin after each meal and an enema of warm water every morning. A pint and a half was used at first, but the quantity was reduced every day by half an ounce. She was made to take full diet with extra milk and cream. She improved with remarkable rapidity; and when seen six weeks after the beginning of treatment her weight had increased from 7 st. 12 lb. to 9 st. 7 lb.; she looked and felt better than ever before, and her mother said her character had quite changed, as she was brighter and better tempered than she had been for years. During the last fortnight of treatment the bowels had been opened naturally every morning; she still took half an ounce of liquid paraffin three times a day, and a small enema was given each evening with very little result, showing that the natural action in the morning was sufficient. The enemata were therefore discontinued, and an X-ray examination a week later, after she had given up the paraffin for three days, showed that there was no longer any ileal or colic stasis, some of the barium sulphate being passed the morning after the barium breakfast. The transverse colon had risen to its normal position, dropping only just below the umbilicus on standing; before the treatment began, its lowest point, measured orthodiagraphically, was 4 in. below the umbilicus on standing. Four months after she had got up she was getting her bowels open with a little paraffin and aloin: she had gained a few more pounds in weight, and her general health continued to be excellent.

Case XII : Dyspnœa due to Ptosis of the Diaphragm in a Case of General Visceroptosis.—A lady, aged 50, had suffered for a long time from neurasthenic symptoms accompanied by indigestion and shortness of breath. An X-ray[1] examination showed that she had an "orthostatic hour-glass stomach," the contraction being due to the drag upon the stomach in the erect position, as it disappeared when she lay down. In a horizontal position the diaphragm was normal and its respiratory excursion was 2½ in. In the erect position it dropped almost into the position of extreme inspiration, so that even with a great effort it only descended ¼ in. Consequently diaphragmatic respiration was impossible



(*a*) Horizontal. (*b*) Vertical.

Case XII: Ptosis of diaphragm in case of general visceroptosis.—Reproductions of tracings drawn orthodiagraphically, showing ptosis of diaphragm, heart, and stomach; the stomach has an "orthostatic hour-glass contraction" in the vertical position. *d*, diaphragm in position of rest; *d'*, diaphragm on maximum inspiration; *d''*, diaphragm when abdomen is compressed; *d*—*d'* in (*a*) = 2½ in.; *d*—*d'* in (*b*) = ¼ in.

in the erect position, though normal on lying down. The abdominal muscles were exceedingly feeble, the visceroptosis being clearly due to this. When she was given an abdominal support the diaphragm was pushed up, so that the normal respiratory excursion became possible and the dyspnœa disappeared.

[1] *Proceedings*, 1912, v (Med. Sect.), p. 60.

I believe that a similar condition is a not uncommon cause of dyspnœa in individuals with weak abdominal muscles. Many patients suffering from heart failure, who are well whilst they are resting in bed, but are unable to take any exertion when they get up, are relieved by using a support for their weak abdominal muscles, so that the diaphragm can be maintained in its normal position.

DISCUSSION.

The PRESIDENT said the Section was very much indebted to Dr. Hertz for this exhibition; the series was a most interesting one. What had relieved his mind most was the demonstration that medical methods were effective in cases of intestinal stasis, remembering the severe operations which had been devised for the condition.

Dr. HERNAMAN-JOHNSON reminded the meeting that some of Dr. Hertz's excellent results were obtained by putting the patients to bed for some time, and by using some kind of mechanical support. In the case of people who were poor and could not lie up away from their work, he had found a useful alternative in stimulation of the abdominal muscles by the sinusoidal current rhythmically interrupted. Where that was not available, and in less severe cases, ordinary faradism could be used, interrupted by a metronome. One might or might not combine this with a mechanical support, or with the administration of cascara and paraffin. In the latter event the patients usually complained of diarrhœa after the first two or three days, and it was then advisable to discontinue the paraffin and cascara. He did not offer these suggestions as a rival treatment, but as an alternative one when the patient could not afford to lie up; it was desirable also to restore the tone of the muscles, striped and unstriped, so that an abdominal belt might be dispensed with as soon as possible. The results of a six or eight weeks' course seemed to be lasting; he had followed up cases three years later and found there had been no return of the trouble. Relapse might, however, occur if the patient returned to an unhealthy way of living. No subject of stasis should be subjected to the severe operation until the treatment mentioned by Dr. Hertz and himself had been given a good trial.

Dr. BARCLAY desired to corroborate what Dr. Hernaman-Johnson had said; he had seen such cases pick up extraordinarily under the application of massage, exercises, and the use of the sinusoidal current.

Dr. REGINALD MORTON said he could bear testimony to the value of the electric current in these cases of stasis, particularly the slow sinusoidal current, which should be reduced to a rate of one impulse per second, so long as they were strong enough, because the time element in the contraction of

unstriped muscle was a slow one, and was still further reduced when there was a loss of tone in the muscle concerned. He, like the President, had been very glad to hear the testimony of Dr. Hertz, because as an old-fashioned person he considered that every person retained some elementary rights concerning his own digestive tract, and that he need not necessarily hand it over to the surgeon. One had hesitated, remembering what the surgical treatment meant, to tell a patient he had intestinal stasis.

Mr. BOKENHAM said he would like to add his testimony to that of Dr. Morton and others, with regard to the great value of stimulation of the abdominal muscles by very slow rhythmic interruptions of the faradic current. Many years ago he was uncertain as to what form of current was the best, and in some cases he used, apparently with good results, currents of high frequency; but for some years he had been in the habit of treating cases of intestinal stasis with very slow interrupted currents, and with excellent results. The "Morton wave" current obtained with an efficient static machine running at a slow speed, the discharges being kept adjusted to the limit of easy tolerance, seemed in certain instances of special value.

Dr. JORDAN desired to point out that operative procedures did not constitute the routine treatment of chronic intestinal stasis. Resort to operation was reserved for those cases in which other means of treatment were unavailing. As a knowledge of stasis became more general, and patients came under proper treatment earlier, there would be even fewer cases in which operative interference would be found necessary. He had been much interested in the fine series of slides which Dr. Hertz had shown.

Glycosuria in Chronic Intestinal Stasis.

By ALFRED C. JORDAN, M.D.

DIABETES mellitus, ever since it was first recognised, has been a source of ardent research, and a subject of deep interest. An enormous literature has been built up, and many ingenious theories devised in the desire to explain its causes.

In a mass of disconnected observations there stand out prominently three experimental methods of producing glycosuria: Firstly, Claude Bernard's "diabetic puncture" of the floor of the fourth ventricle of the brain; secondly, the administration of certain drugs, especially phloridzin; and thirdly, the extirpation of the pancreas. Of these three classes of experiment, the third—that of removing the pancreas by operation—is seen at once to be by far the most important as regards the light it throws upon the ætiology and pathology of diabetes mellitus.

Claude Bernard's puncture causes only a transitory glycosuria; drug diabetes passes off as soon as the drug is left off; but the extirpation of the pancreas—say in a dog—is followed after a day or even after a few hours by pronounced glycosuria, which increases to the third day, and continues till the death of the animal from inanition in about four weeks. In other essential respects the disease resembles diabetes mellitus. There is polyuria. The blood shows a marked increase of sugar (polyglycæmia). On the approach of the final stage the excretion of sugar begins to diminish, although food is being taken, and a few days before death the sugar may disappear from the urine. When the sugar begins to diminish we find appearing in the urine (just as in diabetes mellitus) acetone, aceto-acetic acid, and β-oxybutyric acid.

Obviously, then, this discovery of the effect of extirpating the pancreas is one of extreme importance in the study of diabetes, and this is not diminished by the circumstance that the new fact has not led to a specific cure for the disease. It is easy to find reasons why a cure is not effected by feeding on pancreas substance, or by administering pancreas "tabloids," &c.; short of a specific cure, however, the new knowledge of the relation of the pancreas to persistent glycosuria is leading to important results, not only from the pathological but also from the therapeutic standpoint.

All are agreed that diabetes mellitus is not always due to the same cause. The pancreas shows no lesion in every case. But there is definite disease of the pancreas, discoverable post mortem, in about 75 per cent. of the cases. It is hardly necessary to state the converse, that disease of the pancreas is not always accompanied by glycosuria. Experimental extirpation shows that if one-fourth of the pancreas be left there will be no glycosuria. Hence we should not expect to get glycosuria unless three-fourths of the pancreas were destroyed or put out of gear. Cammidge finds that 7·4 per cent. of patients in whom disease of the pancreas can be shown to exist pass sugar in their urine. Cammidge's reaction indicates insufficiency of the glycogenic function of the pancreas; it shows pre-diabetic changes.

The Pancreas in Chronic Intestinal Stasis.

We have now to consider the bearing of the preceding remarks on the subject of the present communication. The main facts of chronic intestinal stasis are now well known. The undue retention of the intestinal contents in the lower coils of the ileum (ileal stasis) leads to

the invasion of these coils by microbes from the cæcum. The lower ileal coils are sterile (or nearly so) in health, and they are not able to deal with large doses of bacterial toxins; the result is a general toxæmia with its well-known train of symptoms.

These over-loaded lower ileal coils produce a constant pull upon the mesentery when the patient is upright. If the patient be fairly robust, a thickening forms in the mesentery at the point where the pull is greatest, and this thickening is the beginning of a "Lane's ileal kink." If the patient be feeble the mesentery yields, and the attachment of the mesentery to the posterior surface of the abdomen slips down. In this way the whole of the small intestine is pulled downward, and a kink is produced at the duodeno-jejunal junction where the unsupported jejunum arises from the fixed end of the duodenum. Behind this kink the duodenum becomes distended, and the distension is readily shown on X-ray examination with bismuth; the exaggerated duodenal peristalsis is also seen. At a somewhat later stage the distended and congested duodenum is invaded by bacteria, which ascend the small intestine from the lower ileum. Many untoward results may follow: duodenal ulceration; infection of the gall-bladder by way of the common bile-duct, leading to cholecystitis and gall-stones; and chronic pancreatitis through infection of the pancreatic duct. The general toxæmia also causes changes which have become familiar to those who have followed Sir Arbuthnot Lane's work. One of the earliest and most constant of these in woman is shown in the breasts, which become nodular. This chronic mastitis begins in the upper and outer quadrants of the breasts, and often goes on to involve the whole breast, and then advances to the stage of chronic cystic disease, and finally it may become cancerous. The changes in the pancreas are analogous, but are undoubtedly more severe, since the pancreas is subject not merely to the general toxæmia but to a direct microbic invasion from the duodenum. At operations on the subjects of chronic intestinal stasis, the pancreas is found to be nodular, while it is smooth and soft in healthy subjects. There can be no doubt that the chronic pancreatitis yields to successful treatment of the stasis, just as we may observe the nodules in the breasts disappear with the relief of stasis, whether by operation or by treatment.

Stasis in Glycosuric Subjects.

There is much evidence that in glycosuria we have usually to deal with the subjects of chronic intestinal stasis. Indican is found in the urine, and also xanthin bases and tyrosine. Frequently we find the glycosuria associated with chronic gastro-intestinal disorders, and these have existed for years in many of the cases. One of the most universal indications for treatment in glycosuria is to relieve the chronic constipation which exists.

Transitory glycosuria is well known to occur in the subjects of rheumatoid arthritis and of Graves's disease, and in chronic dyspeptics. There have been many cases of glycosuria in the subjects of "appendicitis." These four complaints are among the results of chronic intestinal stasis.

Cases.

My attention was first drawn to the connexion between glycosuria and chronic intestinal stasis three and a half years ago in a tragic way. A young officer, aged 22, was sent to me for an investigation of the alimentary tract. He had been perfectly well till four months previously when he had an attack of "appendicitis." An abscess formed in the right iliac fossa, and this was opened at Gibraltar and a pint of pus was let out. A small leaden shot came out with the pus; this was thought to have been swallowed with game on some previous occasion. Phlebitis of the left leg came on a fortnight after the operation, with thrombosis of the femoral vein. This kept him in bed seven weeks. The wound healed except for a small stitch sinus, and he made a good recovery. Ten days before coming to me he became constipated and suffered from flatulence, passing wind both by the mouth and by the rectum. There was no pain.

The most striking result of the X-ray investigation with bismuth was the discovery of extreme delay in the lower end of the ileum, the last coils of which were enormously dilated. Most of the bismuth had reached the lower end of the ileum after four and a half hours, but there was still bismuth in the ileum after forty-nine hours (figs. 1 to 3). The dilated terminal coil of the ileum lay in front of the cæcum. On pushing this coil toward the middle line of the body the ileo-cæcal entrance was uncovered, and the appendix was shown lying beneath the cæcum (fig. 2). Subsequently there was found to be great

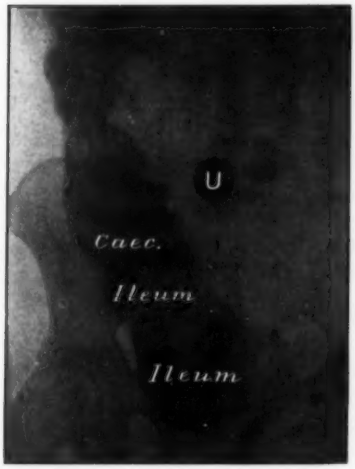


FIG. 1.

Taken on the couch eleven hours after a bismuth meal, in an officer, aged 22, who died in diabetic coma a few days later. There is a large amount of bismuth in the lower coils of the ileum, and the terminal coil of the ileum is greatly dilated. There is a good deal of bismuth in the cæcum and ascending colon. U, the umbilicus marked by a penny.

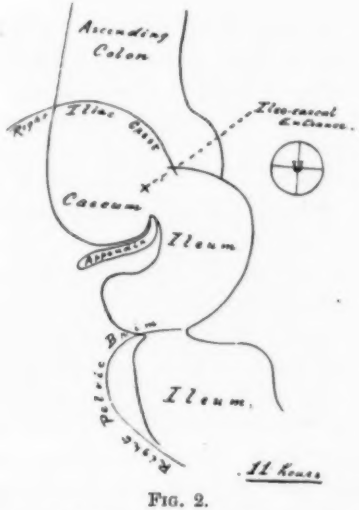


FIG. 2.

Diagram showing the position of the parts seen in fig. 1, when the cæcum was raised.

retardation in the passage of the bismuth through the large intestine, practically the whole of it being still in the transverse colon after ninety-eight hours (fig. 4).

He was admitted to a nursing home with a view to operation. On examining his urine there it was found, to the surprise of all concerned, to contain a large percentage of sugar. He went downhill very rapidly, and died in a few days of diabetic coma, no operation having been performed.

Since then I have often come across slight or transitory glycosuria in the subjects of stasis, but more recently I had another striking case which ended as tragically as the first.

A woman, aged 47, had been the subject of Graves's disease at the age of 30. There had been a large goitre, exophthalmos, and tremors. This complaint had yielded to treatment after six months; the chief features of the treatment were rest in bed, diet, and aperients. She was subject to chronic rheumatism, but was in fairly good health till five months before I saw her for Sir Arbuthnot Lane and Dr. James Allan. She then began to suffer from thirst and a bad taste in the mouth. There was loss of appetite and occasional nausea, and she began to waste. She became constipated, though she had not obviously been constipated before. The urine was found to contain a large percentage of sugar.

The following are the chief points of my examination: The stomach was large and exhibited active peristalsis. The pylorus was normal in form, but showed spasm. After a few minutes there was a partial relaxation of the pyloric sphincter, and the duodenum filled with bismuth. It was dilated, and showed strong "writhing" contractions with repeated regurgitation of the bismuth from the third to the second part of the duodenum, only traces of bismuth having entered the jejunum at the end of fifteen minutes, in spite of the powerful duodenal peristalsis (fig. 5). At the end of six hours half the bismuth was still in the stomach, half was in the lower coils of the ileum. No bismuth had entered the cæcum. At the end of nine hours there was still much bismuth in the stomach; a good deal had now entered the cæcum and the ascending colon, and the terminal coil of the ileum was shown. It was hypertrophied, feeling like a thick cord; its course was tortuous, and it was firmly tied down in the right iliac fossa at a point about 4 in. from its entrance into the cæcum (fig. 6). The appendix was shown immediately beneath the cæcum, and appeared healthy. The following day, twenty-three hours after taking the bismuth, there was no longer

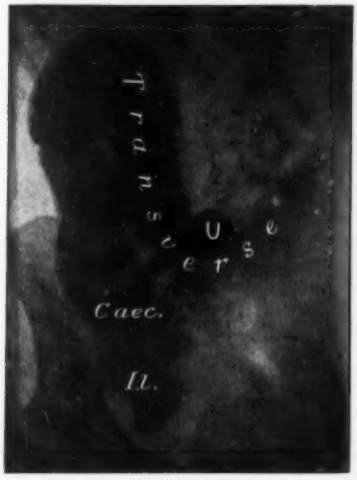


FIG. 3.

Taken thirty-five hours after the same bismuth meal. There is still bismuth in the lower end of the ileum, and very little bismuth has reached the middle of the transverse colon.

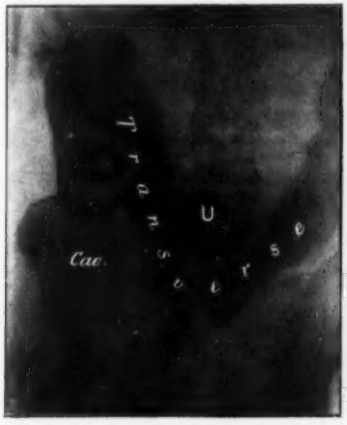


FIG. 4.

Taken ninety-eight hours after the same bismuth meal, showing great stasis in the large intestine. Nearly all the bismuth is still in the transverse colon, which has dropped.

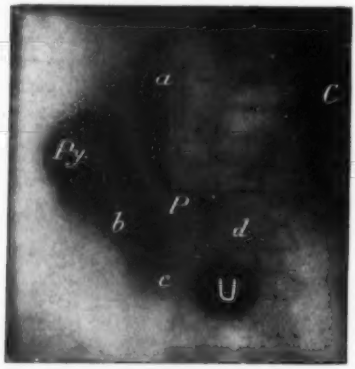


FIG. 5.

Taken on the couch after a bismuth meal, in a woman, aged 47, who died shortly afterwards in diabetic coma. The stomach was large, and showed active peristalsis. There was pyloric spasm. The duodenum was dilated, and showed strong "writhing" peristalsis, typical of chronic intestinal stasis; there was repeated regurgitation of the bismuth from the third to the second part of the duodenum, only traces of bismuth having entered the jejunum at the end of fifteen minutes in spite of the strong duodenal peristalsis. *C*, *P*, the cardiac and pyloric portions of the stomach; *a*, *b*, *c*, *d*, the four parts of the duodenum; *Py*, the pylorus; U, the umbilicus.

FIG. 6.

Taken on the couch nine hours after the same bismuth meal. There was still much bismuth in the stomach. Some had reached the cæcum and the ascending colon. There is a well-marked, typical ileal kink ("Lane's kink") tying down the terminal coil of the ileum in the right iliac fossa. The terminal coil is thick-walled and tortuous. The appendix, seen under the cæcum, appears healthy.

FIG. 7.

Taken twenty-three hours after the same bismuth meal, showing the ileal kink as before with extreme ileal stasis, the lower ileal coils being still well filled with bismuth.

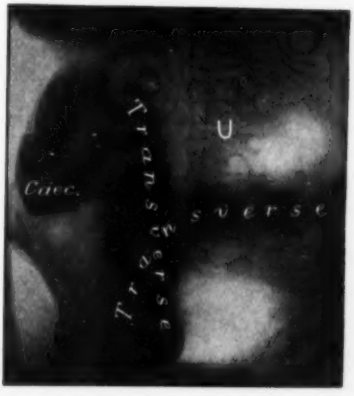


FIG. 8.

Taken forty-seven hours after the same bismuth meal—i.e., at a time when all the bismuth should have been passed. The transverse colon has dropped so as to form a loop in the deepest part of the pelvis, and no bismuth has advanced beyond the middle of the transverse colon. After ninety-five hours very little bismuth had got beyond the splenic flexure.

any bismuth in the stomach, but the lower ileal coils were still well filled with it, indicating extreme ileal stasis. The ileal kink was again shown (fig. 7). The cæcum and ascending colon were distended with bismuth; no bismuth had entered the transverse colon. After thirty hours all the bismuth was in the large intestine, and after forty-seven hours (at a time when all the bismuth would have been evacuated in a normal subject) none had advanced beyond the middle of the transverse colon. This organ took the extraordinary course shown in the skiagram (fig. 8), of dropping vertically from the hepatic flexure down to the pelvis, making a complete loop in the pelvis, and crossing the middle line of the body at a level far lower than normal. Even after ninety-five hours, nearly the whole of the bismuth occupied the long, tortuous transverse colon, only a little having entered the descending and iliac colon, and none having passed into the pelvic colon or rectum.

As in the case previously described, there is no question about the extreme degree of the stasis. Unfortunately, the end was as disastrous as in the other case. The patient was admitted to Guy's Hospital, and after a few days she died in diabetic coma, no operation having been possible.

No post-mortem examination was obtainable in either of the cases, but they are so striking that they compel attention, and leave no way of escape from the conclusion that there is a very definite relation between diabetes mellitus and chronic intestinal stasis.[1]

Case of Peptic Ulcer of the Œsophagus.

By A. E. Barclay, M.D.

Dr. Barclay (Manchester) described a case of peptic ulcer of the œsophagus which had been referred to him by Dr. E. M. Brockbank. She was a nervous girl, aged 18. She gave a history of having at one time brought up some blood, and that, from time to time, she had difficulty in swallowing. On examination, no obstruction to the passing of the food was noted, and the stomach appeared to be quite normal. On questioning her closely she indicated that it was after pieces of hard food had been swallowed that she had the pain. Accordingly she was given toasted bread crumbs, and in a few minutes

[1] *See* N. Mutch, "The Duodenum in Diabetes," *Practitioner*, May, 1915, p. 712.

she said that this had brought on the pain. On giving opaque food it was found that there was complete obstruction at the level of the seventh dorsal vertebra, which persisted for five or ten minutes at a time. The obstruction was clearly due to spasm, and it was probable that the crumbs irritated a small ulcer and set up the spasm. Œsophagoscopic examination by Sir William Milligan showed a small ulcer about ¼ in. in diameter.

The ulcer was treated by ionisation of zinc. A bobbin-shaped electrode on a wire, insulated with shellac except at the neck of the bobbin, was dropped into the stomach. The patient then took bread crumbs until the spasm came on. The bobbin was then easily pulled up till the obstruction was felt; applying more traction the top of the bobbin slipped through the spasm, and the neck was firmly gripped and held in position by the spasm itself in contact with the ulcer. With a large electrode on the arm a current of 10 ma. was passed from the positive electrode in the œsophagus for about ten minutes. There was a tendency for the spasm to relax, and the wire had to be held carefully to feel when this occurred, as the electrode almost at once got out of position, as was seen on the fluorescent screen. When the electrode was taken out there was a black mark on one side of the neck of the electrode showing the size and shape of the ulcer through which the current had passed. Relief of symptoms was almost immediate, and the patient was perfectly well for three months. Some faulty teeth were then extracted and another ionic treatment given, with the result that the patient remained perfectly well for a year. A letter had just been received, however, saying there had been a recurrence. It was proposed to repeat the procedure but with rather stronger current.[1]

[1] 20 ma. were passed for ten minutes. The blackening of the electrode showed that the ulcer was about ½ in. in diameter, and situated on the right side of the œsophagus—i.e., in exactly the same position as before. A fortnight after the treatment the patient can eat practically anything and has no pain at all.

Demonstrations.

By A. E. Barclay, M.D.

Slides were shown illustrating :—

(1) Hour-glass condition following the wounding of the stomach from a swallowed pin. The spasmodic hour-glass condition lasted several weeks.

(2) Aerophagy with marked eructations from the swallowing of air into the œsophagus, which was shown distended with the air.

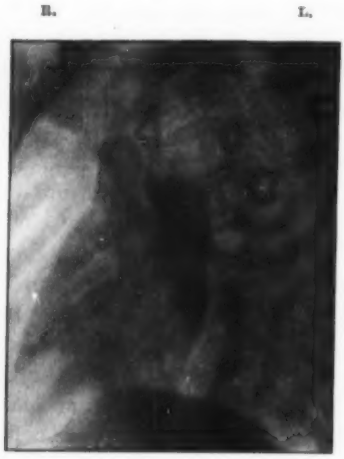


Fig. 1.

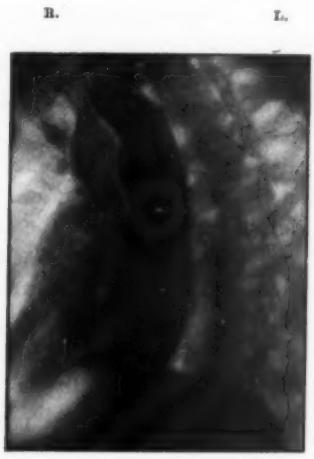


Fig. 2.

Figs. 1 and 2.—Obstruction of the œsophagus. Note the ragged outline of the lower part of the shadow. It was thought that this was due to the inroads of a growth. The second radiogram, taken a little later, indicates clearly that the opaque food is canalising the retained ordinary food in the dilated œsophagus. The case was one of cardiospasm in which the patient had "educated" the œsophagus to tolerate large quantities of food.

(3) Illustrating the mechanism of the production of the recurrent borborygmi from air in an atonic stomach.

(4) Illustrating how food retained in the lower end of the œsophagus may give a strong suggestion of extensive growth invading the œsophagus (figs. 1 and 2).

(5) An abnormally mobile liver associated with Hirschsprung's disease (figs. 3 and 4).

(6) Gas-containing abscess of the peritoneal cavity.

R. L.

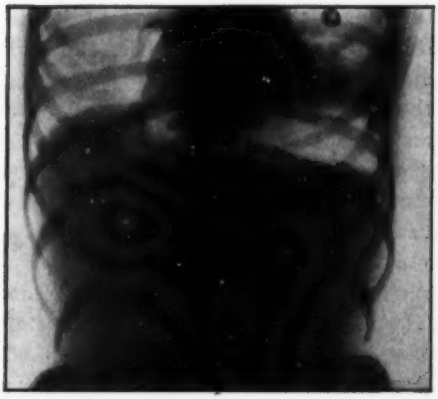


FIG. 3.

With the patient standing. A large air-space was seen, extending from the left side to the nipple line on the right and bounded below by a fluid line that splashed when the patient was shaken. A few mouthfuls of the opaque food could be seen in what appeared to be a normal stomach *behind* this air-space and fluid.

R. L.

FIG. 4.

With the patient lying down, the air-space could be seen as a bubble, just below the abdominal wall and spread out *over* the stomach. It was the lateral view of the patient that showed the air and fluid in this cavity were subperitoneal. The pus and gas that were evacuated were extremely offensive. The case had been a most obscure one and, in fact, was referred to the X-ray Department for examination of the kidneys. With the information of the X-ray examination one was able to obtain a definite history of dyspepsia and a sudden acute pain as the onset, presumably due to a perforation.

(7) Hair-ball in the stomach. The patient, a girl, aged 28, was referred by Dr. Ramsbottom in June, 1913. Clinically, the case was an obscure abdominal tumour, presumably an enlarged spleen or in connexion with the pancreas, although the possibility of some rare gastric tumour was considered. As is usual in the case of abdominal tumours, nothing abnormal was noted on screening the patient; although the tumour could be felt, it could not be seen, and was apparently of the same density as the abdominal tissues. The examination was conducted with the patient in the erect posture, and in all such cases bismuth food is given in order to establish the relationship of the stomach and other parts of the alimentary canal to the tumour. In this case the bismuth flowed into the stomach, and then began to canalise down the greater curvature (fig. 5), showing very clearly that the tumour was not the spleen, otherwise the greater curvature would have been displaced to the inner side of it. At this stage the appearances were those sometimes seen in advanced cases of carcinoma, involving the whole of the pyloric end and lesser curvature of the stomach. Presently, however, as more food was given, the shadow extended down the lesser curvature, apparently around the mass, which was evidently therefore not to the inner side of the stomach, but either inside, in front, or behind it. A little manipulation and rotation of the patient quickly demonstrated that the mass displacing the bismuth (showing as a lighter area in the midst of the dark shadow of the bismuth) was actually within the stomach. By means of palpation it was easy to demonstrate, not only that it was within the stomach, but also that it was freely movable within the stomach, and fig. 6 shows how the tumour could be displaced, the top of it rising above the level of the bismuth food, and showing as a rounded shadow in the clear airspace in the fundus of the stomach. In order to demonstrate the nature of the tumour still more clearly the fundus of the stomach was distended with CO_2, and into the large "Magenblase" thus obtained the hair-ball was pushed up (fig. 7). It gave a heavy shadow, because of the coating of bismuth it carried up with it. The diagnosis was therefore so complete that not only could the nature and shape of the tumour be predicted, but also its size, which was given as 9 in. long by 3 in. wide, while the predicted shape of the tumour corresponded almost as closely (fig. 8). The case was referred to Mr. Burgess, who enucleated the mass and the patient made an uninterrupted recovery. The hair had apparently been swallowed when she had scarlet fever twenty years previously. She denied having swallowed any hair to her own knowledge at any time.

FIG. 5.

FIG. 6.

FIG 7.

FIG. 8.

Hair-ball in the stomach.

Case of Hernia of the Stomach through the Diaphragm in a Child, aged 9.

By W. J. S. Bythell, M.D.

The following notes upon this case of hernia of the stomach through the diaphragm are of interest from both the surgical and the radiographic points of view.

The patient, a boy, aged 9, was admitted to the Manchester Children's Hospital on January 6, 1914. The previous history (which was obtained with difficulty) consisted of attacks of persistent vomiting for some six months, the condition steadily getting worse. Apparently there was never at any time much abdominal pain.

On admission the child was extremely thin and looked ill. The abdomen was dull on the right side from the costal margin downwards, and tympanitic on the left. The right rectus muscle was distinctly prominent. For the first seventeen days after admission he vomited nearly every day, usually profusely: there was no abdominal pain or tenderness. The child appeared to be getting thinner. A diagnosis of pyloric obstruction was made from the clinical symptoms.

On January 19 he was sent to me for X-ray examination. On giving him a bismuth meal I found that it passed to the right of the middle line instead of to the left at the cardiac orifice, suggesting at the commencement of the examination that the stomach was transposed, although the position of the heart was normal. The outline of the stomach, however, was not that of a normally shaped stomach merely transposed to the right, but more like that of the upper sac of an hour-glass stomach. There was also obvious delay in the emptying of the organ, as none had passed through the pylorus at the end of seventy-five minutes. When I saw him twenty-four hours later the whole of the bismuth was in the large intestine; the latter was normal in shape and position, except that the transverse colon was somewhat high in the abdomen.

The following day I saw him five hours after another bismuth meal. As you will see from this slide (fig. 1), the greater part of this meal was still in the stomach on the right side of the middle line; a small quantity having passed into the small intestine was situated chiefly in the ileum. The slide also suggests that the transverse colon

is higher than normal, as the skiagram was taken with the child in the upright position.

The next day I arranged for him to be sent to my rooms in order that my partner, Dr. Barclay, might see him with me. The next slide (fig. 2) shows the condition on that occasion. The whole of the bismuth previously given had disappeared with the exception of a small trace in the descending colon, and on giving another meal we found that it again passed to the right side.

At no time did I see any bismuth actually pass out of the stomach, so I was unable to obtain any information as to the position of the pylorus.

FIG. 1.

FIG. 2.

The diagnosis was not clear at first. My original idea was that the stomach was perhaps dragged over to the right side by adhesions, with mechanical obstruction of the outlet, but Dr. Barclay afterwards suggested the possibility of a hernia of the stomach through the diaphragm, and on consideration this seemed to me to be the most likely diagnosis, as the lung structures at the right base could be seen clearly through the air-distended fundus.

On January 24, three days later, Mr. Howson Ray, Surgeon to the Hospital, operated, and the following details are taken from the Hospital notes: "On opening the abdomen to the right of the middle line, and displacing the right rectus outwards, the epigastrium was found occupied by the colon; only a small piece of the stomach could be

seen very far back under the diaphragm. On further exploration the major part of the stomach was discovered herniated through the œsophageal opening. The other abdominal organs were normal. The stomach was brought down and stitched to the anterior abdominal wall by four or five silk sutures, and the abdominal wound closed."

For the next sixteen days the boy did well; there was no vomiting, and he put on weight. On February 10, however, there was profuse vomiting, and he vomited every day up to February 27, when he was again sent to me for X-ray examination. After seeing him I reported that the stomach had passed back through the diaphragm, and was exactly as when I first saw him. There was again pyloric obstruction.

On March 3, therefore, Mr. Howson Ray opened the abdomen for the second time, and again found that the stomach had passed through the œsophageal opening of the diaphragm. On this occasion he brought a piece of the stomach through the abdominal incision and did a gastrostomy so as to fix the organ permanently in this position. I may add that at both operations he found that there was a good deal of resistance to the pulling of the stomach down through the œsophageal opening, and that it had a tendency to slip back on relaxing the tension.

I have not seen the boy since the second operation, but the subsequent history appears to indicate that a cure has been attained.

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